

BENTON HARBOR POWER PLANT LIMNOLOGICAL STUDIES  
PART IX. THE BIOLOGICAL SURVEY OF 10 JULY 1970

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Under Contract with:

American Electric Power Service Corporation  
Indiana and Michigan Electric Company

Special Report No. 44  
of the  
Great Lakes Research Division  
The University of Michigan  
Ann Arbor, Michigan

March 1972



## INTRODUCTION

In Part VII (March 1971) of our report series relative to the Donald C. Cook Nuclear Station, we established the following report format:

A. COOK PLANT PREOPERATIONAL STUDIES

- A.1 Recording of Local Water Temperatures
- A.2 Study of Floating Algae and Bacteria
- A.3 Development of a Monitor for Phytoplankton
- A.4 Study of Attached Algae
- A.5 Study of Zooplankton
- A.6 Study of Aquatic Macrophytes
- A.7 Study of Benthic Organisms
- A.8 Study of the Local Fishes
- A.9 Support of Aerial Scanning

B. SURVEYS OF EXISTING WARM WATER PLUMES

C. THE ICE BARRIER AT THE COOK PLANT SITE

D. EFFECTS OF EXISTING THERMAL DISCHARGES ON LOCAL  
ICE BARRIERS

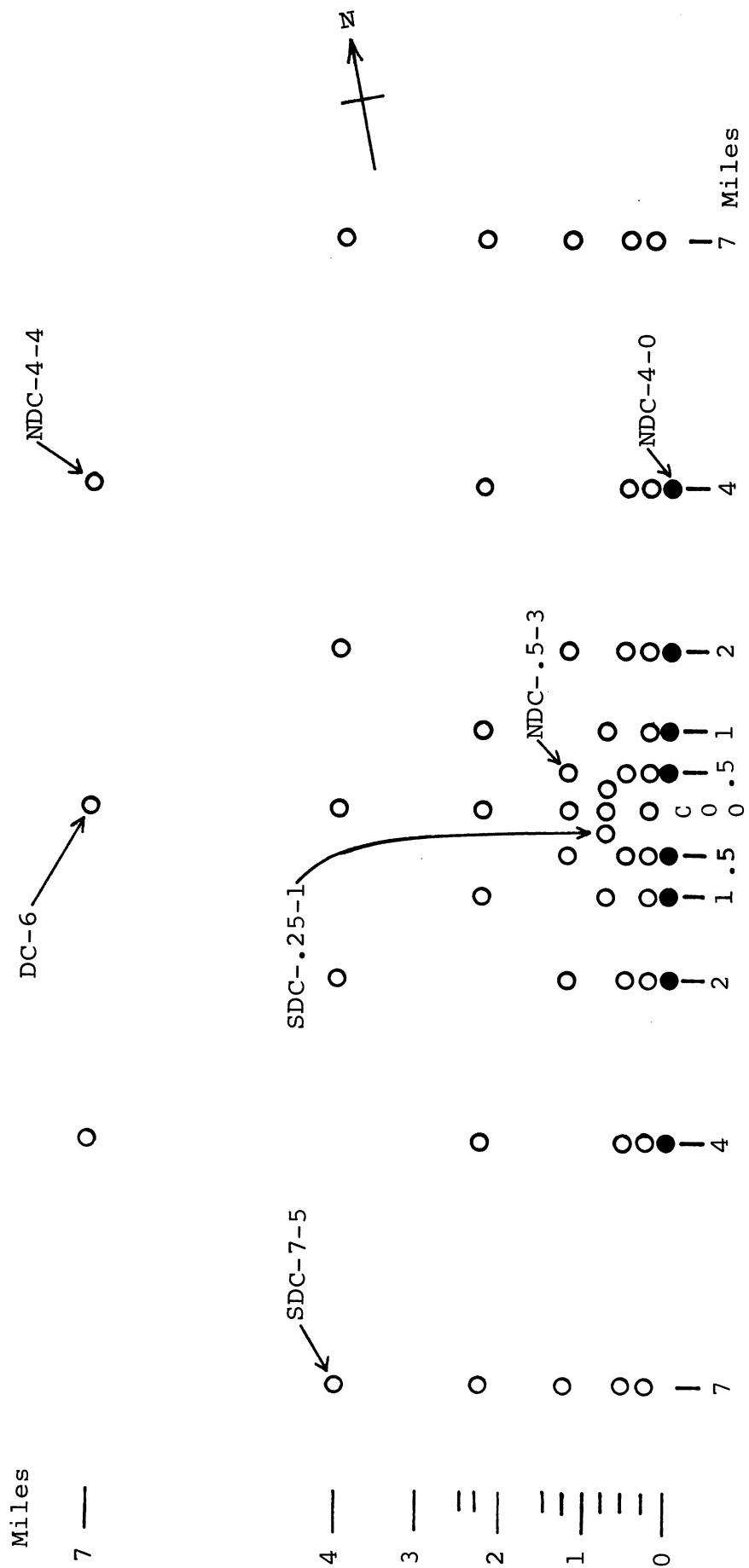
E. EFFECTS OF RADIOACTIVE WASTES IN THE AQUATIC ENVIRONMENT

- E.1 Gamma Scan of Bottom Sediments
- E.2 The Most Sensitive Organism for Concentration of Radwastes
- E.3 Study of Lake Michigan's Present Radioactivity Content  
(FINISHED)

This report covers only items A.2, A.5, and A.7 of the above format. These studies constitute our initial survey of the large-scale set of biology stations related to the Donald C. Cook Plant and were carried out on 10 July 1970.

The layout of sampling stations, with indication of how the stations are numbered is given in Figure 1. The sampling stations, their positions relative to the Cook Plant, their distances offshore, and the water depths encountered are given in Table 1.

FIGURE 1. The Cook Plant Sampling Stations.



The stations are designated as follows: SDC stations are located south of the Donald Cook Plant, NDC stations are north of the plant, and the DC stations are directly offshore. The first number in the designation is the number of miles north or south of the plant. The second number is the serial number of the station. The serial number of the phytoplankton-only stations is 0.

TABLE 1. The Sampling Stations, Their Positions Relative to the Cook Plant, Their Distances Offshore, and the Water Depths Encountered on 10 July 1970.

Station	Position Relative to the Cook Plant							Water Depth (ft)
DC-1	Directly off the plant, 1/4 mi offshore							19
DC-2	"	"	"	"	3/4	"	"	40.5
DC-3	"	"	"	"	1 1/4	"	"	56.5
DC-4	"	"	"	"	2 1/4	"	"	65.5
DC-5	"	"	"	"	4	"	"	79.5
DC-6	"	"	"	"	7	"	"	130.5
NDC-.25-1	1/4 mi north of the plant, 3/4 mi offshore							38
NDC-.5-1	1/2	"	"	"	"	1/4	"	20.5
NDC-.5-2	"	"	"	"	"	1/2	"	26.5
NDC-.5-3	"	"	"	"	"	1 1/4	"	56.5
NDC-1-1	1	"	"	"	"	1/4	"	18.5
NDC-1-2	"	"	"	"	"	3/4	"	33.5
NDC-1-3	"	"	"	"	"	2 1/4	"	57.5
NDC-2-1	2	"	"	"	"	1/4	"	18.5
NDC-2-2	"	"	"	"	"	1/2	"	21.5
NDC-2-3	"	"	"	"	"	1 1/4	"	51
NDC-2-4	"	"	"	"	"	4	"	74.5
NDC-4-1	4	"	"	"	"	1/4	"	17.5
NDC-4-2	"	"	"	"	"	1/2	"	29
NDC-4-3	"	"	"	"	"	2 1/4	"	55.5
NDC-4-4	"	"	"	"	"	7	"	134.5
NDC-7-1	7	"	"	"	"	1/4	"	22
NDC-7-2	"	"	"	"	"	1/2	"	27.5

TABLE 1 continued

Station	Position Relative to the Cook Plant									Water Depth (ft)
NDC-7-3	7	mi	north	of	plant,	1	1/4	mi	offshore	48
NDC-7-4	"	"	"	"	"	2	1/4	"	"	52.5
NDC-7-5	"	"	"	"	"	4	"	"	"	71.5
SDC-.25-1	1/4	"	south	"	"	3/4	"	"	"	49.5
SDC-.5-1	1/2	"	"	"	"	1/4	"	"	"	19.5
SDC-.5-2	"	"	"	"	"	1/2	"	"	"	28.5
SDC-.5-3	"	"	"	"	"	1	1/4	"	"	54.5
SDC-1-1	1	"	"	"	"	1/4	"	"	"	13.5
SDC-1-2	"	"	"	"	"	3/4	"	"	"	40
SDC-1-3	"	"	"	"	"	2	1/4	"	"	61.5
SDC-2-1	2	"	"	"	"	1/4	"	"	"	18
SDC-2-2	"	"	"	"	"	1/2	"	"	"	27.5
SDC-2-3	"	"	"	"	"	1	1/4	"	"	51.5
SDC-2-4	"	"	"	"	"	4	"	"	"	72.5
SDC-4-1	4	"	"	"	"	1/4	"	"	"	14
SDC-4-2	"	"	"	"	"	1/2	"	"	"	37.5
SDC-4-3	"	"	"	"	"	2	1/4	"	"	59.5
SDC-4-4	"	"	"	"	"	7	"	"	"	102.5
SDC-7-1	7	"	"	"	"	1/4	"	"	"	14
SDC-7-2	"	"	"	"	"	1/2	"	"	"	26.5
SDC-7-3	"	"	"	"	"	1	1/4	"	"	51.5
SDC-7-4	"	"	"	"	"	2	1/4	"	"	53.5
SDC-7-5	"	"	"	"	"	4	"	"	"	70.5

TABLE 1 continued. Additional Stations for Phytoplankton Only. (All in 4 Ft of Water)

Phytoplankton samples were taken at all the stations of Table 1. At all stations with serial numbers greater than zero, zooplankton, benthos, and physical measurements were collected as well. Total collections were: 53 phytoplankton samples and 46 each of zooplankton, benthos, and the physical measurements. The physical measurements consisted of surface water temperature, water depth, bottom types, Secchi disc water transparency, and water color as seen above the white 30-cm Secchi disc. Weather conditions and wind and wave characteristics were taken and meteorological data taken on 10 July 1970 apply to all the sections of this report; these data are presented in Appendix A.

## A. COOK PLANT PREOPERATIONAL STUDIES

### A.2 Study of Floating Algae and Bacteria

Techniques for bacteria had not been mastered at the time of this survey.

#### Phytoplankton Techniques

Phytoplankton samples were collected by Nansen bottle at a depth of 1 m, with the exception of the nearshore stations. Nearshore collection (serial number zero stations) were made by submerging an open 1-liter bottle 4 in. below the water surface. All samples were 1-liter whole samples. Each sample was fixed with Utermohl's iodine fixative immediately after collection and stored in an opaque container.

In the laboratory, each sample was concentrated to 100 ml by settling in a 1000-ml graduate cylinder and siphoning off 900 ml of fluid. The concentrated sample was stored in a 100-ml opaque bottle.

Samples were prepared for counting by placing an aliquot of the concentrated sample in a tubular combination settling and counting chamber and allowing the aliquot to settle overnight. The counting chamber containing the settled cells was then separated from the settling chamber, covered, and placed on the microscope. The samples were counted on an inverted binocular microscope at 1000x magnification.

Solitary species, green and blue-green algae colonies, and the filaments of filamentous forms were each counted as one cell. Each colonial diatom cell was counted except when the size of the filaments or colonies prohibited counting the individual cells; in this case, the number of individual cells was estimated.

### Phytoplankton Summary

The phytoplankton summary which follows (Table 2) is based on the one used by the Michigan Water Resources Commission in reporting their phytoplankton collections. Our summaries differ only in that we have counted or estimated the cells in filamentous and colonial diatoms, while the Commission counts a filament or colony as a single organism. The station-by-station phytoplankton records constitute Appendix B.

### Dominant and Codominant Phytoplankters

In each phytoplankton sample, one species or group typically was present in substantially greater numbers. We have called these species or groups "dominant." In six of the stations, however, a second species or group challenged the numerical superiority of the dominant species. When the challenging species or group closely approached the cell numbers of the dominant species, the second most abundant species or group was recorded as a "codominant," and both are listed in the dominant species column of Table 2. In Table 3, those species or groups which were numerically dominant in the samples of the 10 July 1970 Cook Plant survey are presented.

In the 53 phytoplankton samples of the survey, there were 59 dominant or codominant species or groups, of which 49 were diatoms. On the basis of the dominants and codominants of this survey, Lake Michigan in the region of the Donald C. Cook Plant was definitely a "diatom lake" in early July 1970.

TABLE 2. Phytoplankton Summary, 10 July 1970. Units: Cells Per Milliliter; Surface Temperature, C°; ND = Not Determined.

Station	Temper-ature	Coccoid Blue-Green	Fila-men-tous Blue-Green	Coccoid Green	Fila-men-tous Green	Flagel-lates	Centric Diatoms	Pennate Diatoms	Desmids	Other Algae	Total Algae	Dominant Species
DC-1	20.9	0	39	39	7	108	20	167	4	0	384	<u>Tabellaria fenestrata</u>
DC-2	20.9	0	36	85	4	116	8	120	6	0	375	<u>Fragilaria crotensis</u>
DC-3	20.9	0	64	124	6	154	8	288	4	1	648	<u>Tabellaria fenestrata</u>
DC-4	20.7	0	9	278	0	14	4	110	0	0	415	Unidentified green
DC-5	20.2	0	38	23	0	69	2	128	5	0	265	<u>Fragilaria crotensis</u> & <u>Tabellaria fenestrata</u>
DC-6	19.6	0	4	36	0	81	0	185	1	0	307	<u>Fragilaria crotensis</u>
NDC-25-1	21.3	0	36	36	1	163	12	206	4	0	458	<u>Tabellaria fenestrata</u>
NDC-5-0	ND	0	52	315	4	608	482	352	7	0	1,820	<u>Melosira</u> sp.
NDC-5-1	19.7	0	24	32	2	102	101	239	3	0	503	<u>Tabellaria fenestrata</u>
NDC-5-2	20.5	0	56	81	0	192	13	307	1	0	650	<u>Tabellaria fenestrata</u>
NDC-5-3	20.8	0	55	90	2	148	5	224	4	0	524	<u>Tabellaria fenestrata</u>
NDC-1-0	ND	11	60	263	0	193	1,287	575	4	404	2,797	<u>Cyclotella</u> sp.
NDC-1-1	19.9	0	26	115	0	204	441	334	11	26	1,157	<u>Cyclotella</u> sp.
NDC-1-2	20.5	689	17	22	0	66	5	173	0	0	972	Unidentified blue-green
NDC-1-3	20.2	0	124	70	4	161	2	172	8	0	541	<u>Tabellaria fenestrata</u>
NDC-2-0	ND	15	33	223	7	212	386	219	15	0	1,110	<u>Melosira granulata</u>
NDC-2-1	19.8	0	32	53	2	203	212	418	5	0	925	<u>Tabellaria fenestrata</u>
NDC-2-2	20.4	0	22	48	0	189	52	148	7	0	467	<u>Tabellaria fenestrata</u>
NDC-2-3	20.4	0	32	171	4	178	7	208	0	0	600	<u>Tabellaria fenestrata</u>
NDC-2-4	19.3	2	9	76	2	130	4	289	4	0	516	<u>Tabellaria fenestrata</u> & <u>Fragilaria crotensis</u>
NDC-4-0	ND	0	26	675	0	174	582	330	0	52	1,542	<u>Melosira</u> sp.
NDC-4-1	19.9	2	30	564	2	186	1,414	614	0	0	2,812	<u>Melosira granulata</u>
NDC-4-2	19.9	15	18	128	0	210	729	393	2	0	1,495	<u>Melosira granulata</u> v. <u>angustissima</u>
NDC-4-3	19.9	0	28	22	3	67	1	154	0	0	275	<u>Tabellaria fenestrata</u>
NDC-4-4	19.6	0	14	16	1	72	2	108	8	0	331	<u>Dinobryon divergens</u>
NDC-7-1	20.8	4	5	514	3	230	830	229	6	0	1,821	<u>Tabellaria fenestrata</u>
NDC-7-2	20.6	0	25	10,278	1	261	676	322	7	0	11,570	Unidentified green
NDC-7-3	20.2	0	26	89	0	212	382	369	10	0	1,115	<u>Cyclotella</u> sp.

TABLE 2 continued

Station	Tem- pera- ture	Coccoid Blue- Green	Filamen- tous Blue- Green	Coccoid Green	Fila- mentous Green	Flagel- lates	Centric Diatoms	Pennate Diatoms	Desmids	Other Algae	Total Algae	Dominant Species
NDC-7-4	20.6	0	30	742	0	122	0	367	0	0	1,261	<u>Tabellaria fenestrata</u>
NDC-7-5	19.6	0	14	16	1	72	2	111	2	0	218	<u>Tabellaria fenestrata</u>
SDC-.25-1	20.8	1	5	3	1	29	0	94	0	0	132	<u>Tabellaria fenestrata</u>
SDC-.5-0	ND	6	30	145	6	67	377	406	4	0	1,040	<u>Cyclotella</u> sp.
SDC-.5-1	19.9	158	21	55	1	97	121	260	4	0	717	<u>Tabellaria fenestrata</u> ; <u>Aphanothecace</u> sp.
SDC-.5-2	20.8	0	26	32	1	81	38	113	258	0	542	<u>Tabellaria fenestrata</u>
SDC-.5-3	•	•	•	•	•	•	•	•	•	•	•	•
SDC-1-0	ND	0	33	119	0	237	564	382	7	0	1,342	<u>Tabellaria fenestrata</u> ; <u>Melosira</u> sp.
SDC-1-1	19.8	0	41	35	4	143	191	360	0	0	774	<u>Tabellaria fenestrata</u> ; <u>Cyclotella</u> sp.
SDC-1-2	21.0	0	21	16	10	590	3	93	1	0	734	<u>Hypnodinium</u> sp.
SDC-1-3	20.8	0	24	37	4	46	11	263	0	0	385	<u>Tabellaria fenestrata</u>
SDC-2-0	ND	0	17	41	4	139	401	360	0	0	962	<u>Cyclotella</u> sp.
SDC-2-1	20.0	178	24	79	9	102	241	367	6	0	1,006	<u>Cyclotella</u> sp.; <u>Micro- cystis aeruginosa</u>
SDC-2-2	21.2	0	11	22	2	75	2	130	3	0	245	<u>Tabellaria fenestrata</u>
SDC-2-3	20.9	0	35	23	0	50	6	190	3	0	307	<u>Tabellaria fenestrata</u>
SDC-2-4	19.0	0	5	7	0	72	1	206	1	0	292	<u>Tabellaria fenestrata</u>
SDC-4-0	ND	2	52	131	0	180	261	480	6	0	1,112	<u>Tabellaria fenestrata</u>
SDC-4-1	20.2	0	32	32	2	83	60	267	3	0	479	<u>Tabellaria fenestrata</u>
SDC-4-2	21.0	0	56	236	3	101	20	324	2	0	742	Unidentified green
SDC-4-3	20.8	0	68	20	1	80	26	211	1	0	407	<u>Tabellaria fenestrata</u>
SDC-4-4	19.6	0	9	11	1	82	2	193	1	0	299	<u>Tabellaria fenestrata</u>
SDC-7-1	21.5	0	73	56	5	142	62	236	1	0	575	<u>Tabellaria fenestrata</u>
SDC-7-2	21.4	1	93	12,692	4	138	82	337	2	0	13,349	Unidentified green
SDC-7-3	21.0	0	86	58	3	141	32	304	4	0	628	<u>Tabellaria fenestrata</u>
SDC-7-4	20.8	0	105	112	0	259	30	219	4	0	729	<u>Chamydomonas</u> sp.
SDC-7-5	19.8	0	14	68	0	119	22	219	1	0	443	<u>Tabellaria fenestrata</u>

TABLE 3. Dominants and Codominants in the Samples of the Survey

Species or Group	Dominant or Codominant Occurrences
<u>Tabellaria fenestrata</u> (diatom)	32
<u>Cyclotella</u> sp. (diatom)	7
<u>Melosira</u> spp. (diatoms)	6
<u>Fragilaria crotonensis</u> (diatom)	4
Unidentified green algae	4
Unidentified blue-green algae	1
<u>Dinobryon divergens</u> (flagellate)	1
<u>Aphanethece</u> sp. (blue-green)	1
<u>Hypnodinium</u> (?) sp. (dinoflagellate)	1
<u>Microcystis aeruginosa</u> (blue-green)	1
<u>Chlamydomonas</u> sp. (flagellate)	1
TOTAL	59

Spatial Distribution of Dominants and Codominants

Little can safely be said about spatial distribution of phytoplankters, for they can be exchanged from water mass to water mass by turbulent mixing. The problem is compounded by the annual, seasonal, preoperational, and post-operational differences which may be encountered in a continuing series of surveys, such as required for the Cook Plant.

Although we are, at present, only beginning to be accustomed to having massive phytoplankton data with which to work, we have noted some characteristics of the spatial distribution of dominant and codominant phytoplankton species which appear to be worthy of record.

In this survey, the dominant organisms in the surf-zone stations (serial number zero) were the diatom groups Melosira sp. and Cyclotella sp. In the rest of the area, the diatom Tabellaria fenestrata was the most frequent dominant. In stations farthest offshore, the diatom Fragilaria crotonensis was more apt to be dominant than in the inshore stations.

#### The Master List of Phytoplankters Collected During the Survey

Another of the requirements in a long-term series of surveys aimed at detecting changes in phytoplankton populations over a period of time is the routine presentation of lists of all the phytoplankters collected during each survey. Over a period of years, such "master lists" become the means of detecting the arrival of new species or the vanishing of species originally present. We do not expect the latter to happen; our present knowledge of the Lake Michigan phytoplankton indicates that species are not eliminated from the phytoplankton population, but rather that new species appear and are added to the population.

The master list of phytoplankters collected during the survey of 10 July 1970 is presented in Table 4. In this table there are incomplete identifications and unidentified organisms, generally occurring in the green or blue-green groups. We make no apologies for this. Our primary attention is directed to the diatom groups where population composition change is apt to show soonest. Our collections are preserved, and may be re-studied if other organisms or groups exhibit changes which indicate the desirability of re-study. For convenience in inspection of names, the contents of Table 4 are arranged alphabetically.

TABLE 4. Master List of Phytoplankton Collected on 10 July 1970.

<u>Achananthes hauckiana</u>	<u>Coelastrum</u> sp.
<u>Achnanthes</u> sp.	<u>Coelastrum sphaericum</u>
<u>Amphipleura pellucida</u>	<u>Coelosphaerium</u> sp.
<u>Amphiprora ornata</u>	<u>Cosmarium</u> sp.
<u>Amphora ovalis</u>	<u>Crucigenia quadrata</u>
<u>Amphora ovalis</u> v. <u>pediculus</u>	<u>Crucigenia</u> sp.
<u>Amphora</u> sp.	<u>Cryptomonas</u> sp.
<u>Anabaena circinalis</u>	<u>Cyclotella meneghiniana</u>
<u>Anabaena</u> sp.	<u>Cyclotella</u> sp.
<u>Ankistrodesmus braunii</u>	<u>Cymatopleura solea</u>
<u>Ankistrodesmus falcatus</u>	<u>Cymatopleura solea</u> v. <u>apiculata</u>
<u>Aphanothece</u> sp.	<u>Cymbella</u> sp.
<u>Asterionella formosa</u>	<u>Dactylococcopsis</u> sp.
Blue-Green unknown colonies	<u>Diatoma tenuis</u> v. <u>elongatum</u>
<u>Caloneis</u> sp.	<u>Diatoma vulgare</u>
<u>Caloneis ventricosa</u>	<u>Dictyosphaerium pulchellum</u>
<u>Caloneis ventricosa</u> v. <u>truncata</u>	<u>Dinobryon divergens</u>
<u>Ceratium hirundinella</u>	Dinoflagellate cysts
<u>Chlamydomonas</u> sp.	<u>Diploneis</u> sp.
<u>Chlorella</u> sp.	Flagellates
<u>Chroococcus limneticus</u>	<u>Fragilaria brevistrata</u>
<u>Chroococcus turgidus</u>	<u>Fragilaria capucina</u>
<u>Chroococcus</u> sp.	<u>Fragilaria construens</u>
<u>Closterium</u> sp.	<u>Fragilaria crotonensis</u>
<u>Closteriopsis longissima</u>	<u>Fragilaria intermidia</u>
(continues on right column)	<u>Fragilaria leptostauron</u>

TABLE 4 continued

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<u>Fragilaria pinnata</u>	<u>Melosira</u> sp.
<u>Franceia droescheri</u>	<u>Melosira varians</u>
<u>Franceia ovalis</u>	<u>Meridion circulare</u>
<u>Franceia</u> sp.	<u>Microcystis aeruginosa</u>
<u>Glenodinium</u> sp.	<u>Microspora</u> sp.
<u>Gloeocystis</u> sp.	<u>Mougeotia</u> sp.
<u>Golenkinia radiata</u>	<u>Navicula capitata</u>
<u>Gomphonema</u> sp.	<u>Navicula costulata</u>
Green cells	<u>Navicula decussis</u>
Green cells, little	<u>Navicula gastrum</u>
Green cells, round, unknown	<u>Navicula</u> sp.
Green cells, tiny	<u>Navicula tripunctata</u>
Green colony, unknown	<u>Neidium dubium</u>
Greens, unknown, chains	<u>Nephrocytium</u> sp.
Greens, unknown, grapelike	<u>Nitzschia acicularis</u>
<u>Hypnodinium</u> sp.	<u>Nitzschia</u> sp.
<u>Kirchneriella</u> sp.	<u>Oocystis borgei</u>
<u>Lagerheimia citriformis</u>	<u>Oocystis solitaria</u>
<u>Lagerheimia longiseta</u>	<u>Oocystis</u> sp.
<u>Lagerheimia longiseta</u> v. <u>major</u>	<u>Oocystis submarina</u>
<u>Lagerheimia</u> sp.	<u>Oscillatoria</u> sp.
<u>Mallomonas</u> sp.	<u>Pediastrum duplex</u>
<u>Melosira binderana</u>	<u>Pediastrum simplex</u>
<u>Melosira granulata</u>	<u>Pediastrum</u> sp.
<u>Melosira granulata</u> v. <u>angustissima</u>	<u>Peridinium</u> sp.
<u>Melosira islandica</u>	<u>Phormidium</u> sp.
<u>Melosira italicica</u>	<u>Quadrigula chodatii</u>

(continues in right column)

TABLE 4 continued

<u>Quadrigula lacustris</u>	<u>Synedra ostenfeldii</u>
<u>Quadrigula</u> sp.	<u>Synedra</u> sp.
Round cells, broken colonies	<u>Synedra ulna</u>
<u>Scenedesmus abundans</u>	<u>Synedra ulna</u> v. <u>chaseana</u>
<u>Scenedesmus acuminatus</u>	<u>Synedra ulna</u> v. <u>danica</u>
<u>Scenedesmus armatus</u>	<u>Synedra vaucheriae</u> v. <u>fragilaroides</u>
<u>Scenedesmus bijuga</u>	<u>Tabellaria fenestrata</u>
<u>Scenedesmus bijuga</u> v. <u>alternans</u>	<u>Tetraedron lunula</u>
<u>Scenedesmus dimorphus</u>	<u>Tetraedron minimum</u>
<u>Scenedesmus incrassatulus</u>	<u>Tetraedron obesum</u>
<u>Scenedesmus opoliensis</u>	<u>Tetraedron pentaedricum</u>
<u>Scenedesmus quadricauda</u>	<u>Tetraedron regulare</u>
<u>Scenedesmus quadricauda</u> v. <u>maximus</u>	<u>Tetradesmus smithii</u>
<u>Scenedesmus</u> sp.	<u>Tetradesmus wisconsinensis</u>
<u>Schroederia judayi</u>	<u>Tetrastrum</u> sp.
<u>Sorastrum spinulosa</u>	<u>Treubaria setigerum</u>
Spores	<u>Tribonema</u> sp.
Spores, resting	Unknown cells
<u>Stephanodiscus</u> sp.	Unknown colonies
<u>Staurastrum</u> sp.,	<u>Westella</u> sp.
<u>Stauroneis</u> sp.	Zoospores
<u>Surirella angustata</u>	
<u>Surirella</u> sp.	
<u>Synedra acus</u>	
<u>Synedra delicatissima</u>	
<u>Synedra delicatissima</u> v. <u>angustissima</u>	
<u>Synedra filiformis</u>	
(continues in right column)	

Diversity Indices of the July 1970, and Earlier, Phytoplankton Collections

In this section we follow Wilhm and Dorris (1968),<sup>\*</sup> who developed from information theory a technique for evaluating the structure of bottom fauna communities. We have applied their technique to our phytoplankton collections because (1) the technique is considered to be very largely independent of sample size (allowing the use of our smaller, earlier collections); (2) the technique mathematically considers each component of the population collected; and, most important, (3) the technique is an accepted index of community structure by which to watch for changes in the phytoplankton community structure around the Cook Plant in the ensuing years.

Basically, the Wilhm and Dorris diversity index considers that, in a population composed of a few species or groups and with large numbers of individuals of each species or group, the uncertainty that any one organism collected will belong to a species or group already taken will be low (and the technique computes a low diversity index). Conversely, in a community composed of many species or groups, but with fewer numbers of individuals of any species or group, the uncertainty that any particular organism collected will belong to a previously recognized species or group is high (and the technique computes a high diversity index).

The computation of Wilhm and Dorris is

$$\bar{d} = - \sum (N_i/N) \log_2 (N_i/N) ,$$

in which  $(N_i/N)$  is the percentage of the population, N, that is represented by any one species or group,  $N_i$ , of the collection. Logarithms to the base 2 are natural logarithms multiplied by 1.44269; the logarithms are negative, and a

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\*Wilhm, J.L., and Dorris, T.C. 1968. "Biological Parameters for Water Quality Criteria." BioScience 18(6):477-81.

negative summation is used to provide an answer in positive numbers. The over-bar on  $\bar{d}$  denotes a mean, for their method (extended) also yields maximum and minimum diversity indices.

NOTE: The average diversity index shown at the end of Table 6 is merely the arithmetical average of  $\bar{d}$  values of the individual station collections.

In accordance with our policy of continued analysis of our earlier surveys of the Cook Plant area, we have computed the Wilhm and Dorris diversity indices of our phytoplankton collections earlier than July 1970 (the collection on 25 April 1969 was not made by a comparable method and is not included). The station lists of phytoplankton collected from which these diversity indices have been computed are Tables 3, 4, 5, and 6 of Part VII of our report series relative to the Cook Plant. The results are given in Table 5.

TABLE 5. Diversity Indices of Phytoplankton Samples 1-1.3 Miles Off Cook Plant

Station and Date	Distance from Shore	Depth of Collection	Diversity Index, $\bar{d}$
CP-2 11 August 1969	1.3 miles	6 inches	3.64
COOK 4 October 1969	1.0 mile	15 meters	2.38
COOK 26 April 1970	1.0 mile	15 meters	3.11
COOK 6 June 1970	1.0 mile	15 meters	3.27
(and, for comparison, from the present report)			
DC-3 10 July 1970	1.25 miles	1 meter	3.60

TABLE 6. Numbers of Phytoplankton Species, Number of Individuals Per Milliliter and Diversity of the 10 July 1970 Survey

Station	Number of Species	Number of Individuals	Diversity Index
DC-1	23	390	3.18
DC-2	24	407	3.63
DC-3	30	647	3.60
DC-4	15	448	1.85
DC-5	12	286	2.88
DC-6	11	333	2.39
NDC-.25-1	26	458	3.39
NDC-.5-0	42	1,794	3.92
NDC-.5-1	43	504	3.88
NDC-.5-2	26	647	3.53
NDC-.5-3	17	528	2.89
NDC-1-0	36	3,052	3.90
NDC-1-1	31	1,244	3.88
NDC-1-2	20	974	1.65
NDC-1-3	25	543	3.28
NDC-2-0	36	1,180	4.27
NDC-2-1	43	940	4.05
NDC-2-2	21	504	3.85
NDC-2-3	21	601	3.46
NDC-2-4	20	515	2.91
NDC-4-0	30	1,856	4.01
NDC-4-1	46	3,024	3.89
NDC-4-2	42	1,521	4.01
NDC-4-3	19	277	2.85
NDC-4-4	19	331	3.40
NDC-7-1	46	1,594	3.78
NDC-7-2	50	11,523	1.09
NDC-7-3	41	1,081	3.92
NDC-7-4	17	1,344	2.77
NDC-7-5	21	220	3.29

TABLE 6 continued

Station	Number of Species	Number of Individuals	Diversity Index
SDC-.25-1	9	143	1.94
SDC-.5-0	40	1,038	3.90
SDC-.5-1	33	718	3.62
SDC-.5-2	17	278	2.84
SDC-1-0	33	1,396	3.81
SDC-1-1	27	830	3.33
SDC-1-2	19	757	2.03
SDC-1-3	16	386	2.75
SDC-2-0	34	962	3.55
SDC-2-1	29	1,012	3.58
SDC-2-2	13	265	2.55
SDC-2-3	18	337	3.23
SDC-2-4	12	316	2.29
SDC-4-0	40	1,104	4.22
SDC-4-1	31	567	3.56
SDC-4-2	26	798	3.08
SDC-4-3	18	438	2.84
SDC-4-4	17	331	3.15
SDC-7-1	32	632	3.68
SDC-7-2	42	13,274	0.49
SDC-7-3	37	630	3.54
SDC-7-4	26	712	3.20
SDC-7-5	23	413	2.88
Overall Average Diversity Index			3.20

In Table 6, the number of species or groups present, the number of individual cells per milliliter, and the diversity index for each phytoplankton sample of the 10 July 1970 survey are listed by stations. The field of diversity indices has been contoured and is shown in Figure 2.

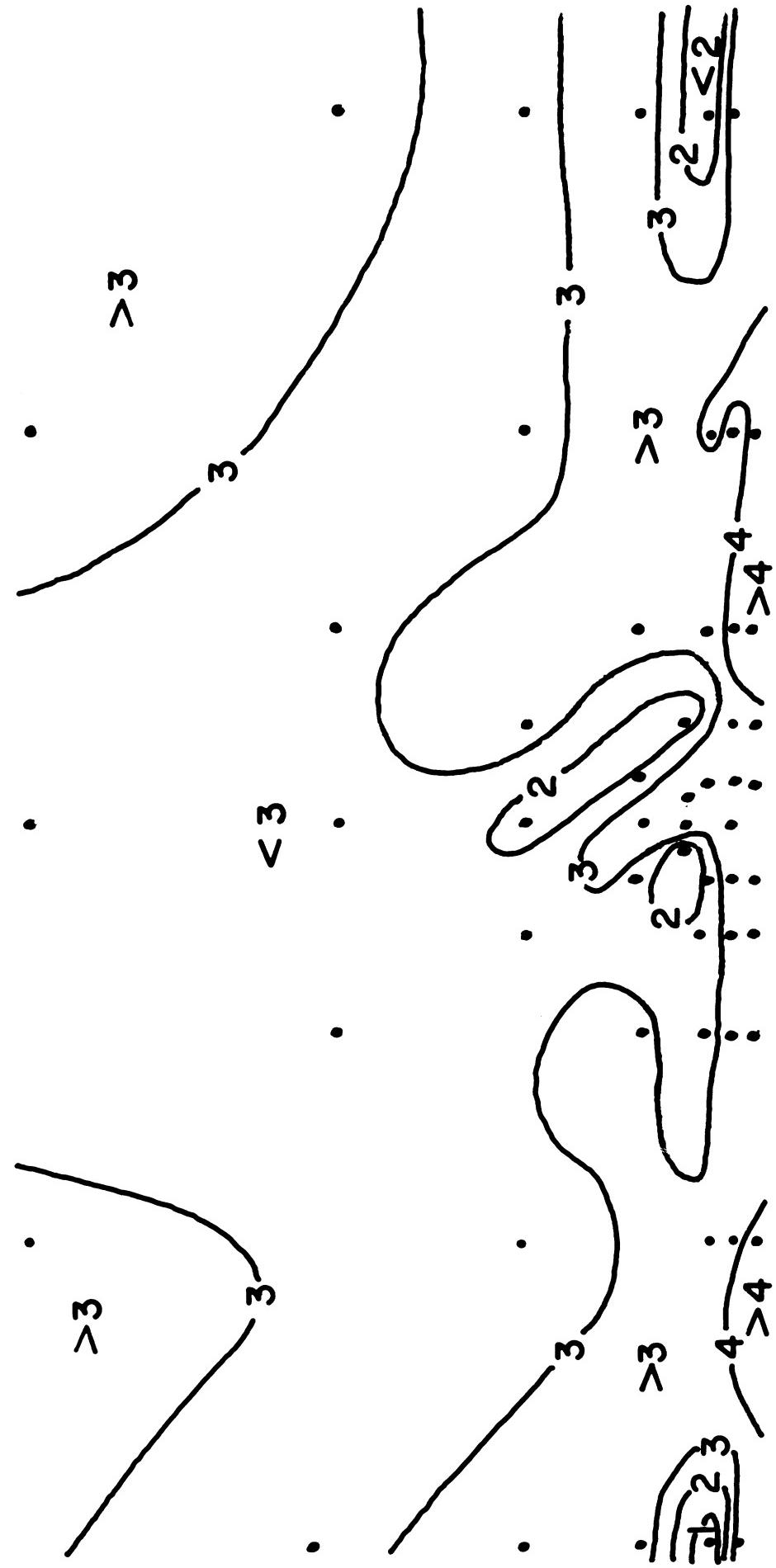
#### Comments on the Phytoplankton Collections

Consideration of the numbers of species collected, the numbers of individual phytoplankters, and of the diversity indices of the station collections (horizontally across Table 6) show only that the individual station collections were greatly different from each other. The adjacent stations, SDC-7-1, SDC-7-2, and SDC-7-3, for example, show variations in numbers of species or groups ranging from 32 to 42, variations of numbers of individuals per milliliter from 630 to 13,274, and variations of the diversity index from 0.49 (at SDC-7-2) to 3.68 (at SDC-7-1).

The conclusion being forced upon us is that small water masses, each with different biotic characteristics, move through the Cook Plant area. The data from our grab-sampling technique is the manifestation of uneven phytoplankton population distribution in these water masses. We have seen, but perhaps not fully appreciated, similar conditions before (see our conclusion in Part VII of our report series wherein floating-bag experiments at NIPSCO's Bailly Station produced only evidence of plankton patchiness). There are many other evidences of plankton patchiness shown in Table 6.

The demonstrable phytoplankton patchiness shown in Table 6 leads us to the conclusion that the overall average diversity index for this survey should be presented only as an objective mathematical summary of data from several

FIGURE 2. Phytoplankton Diversity Indices Contours.

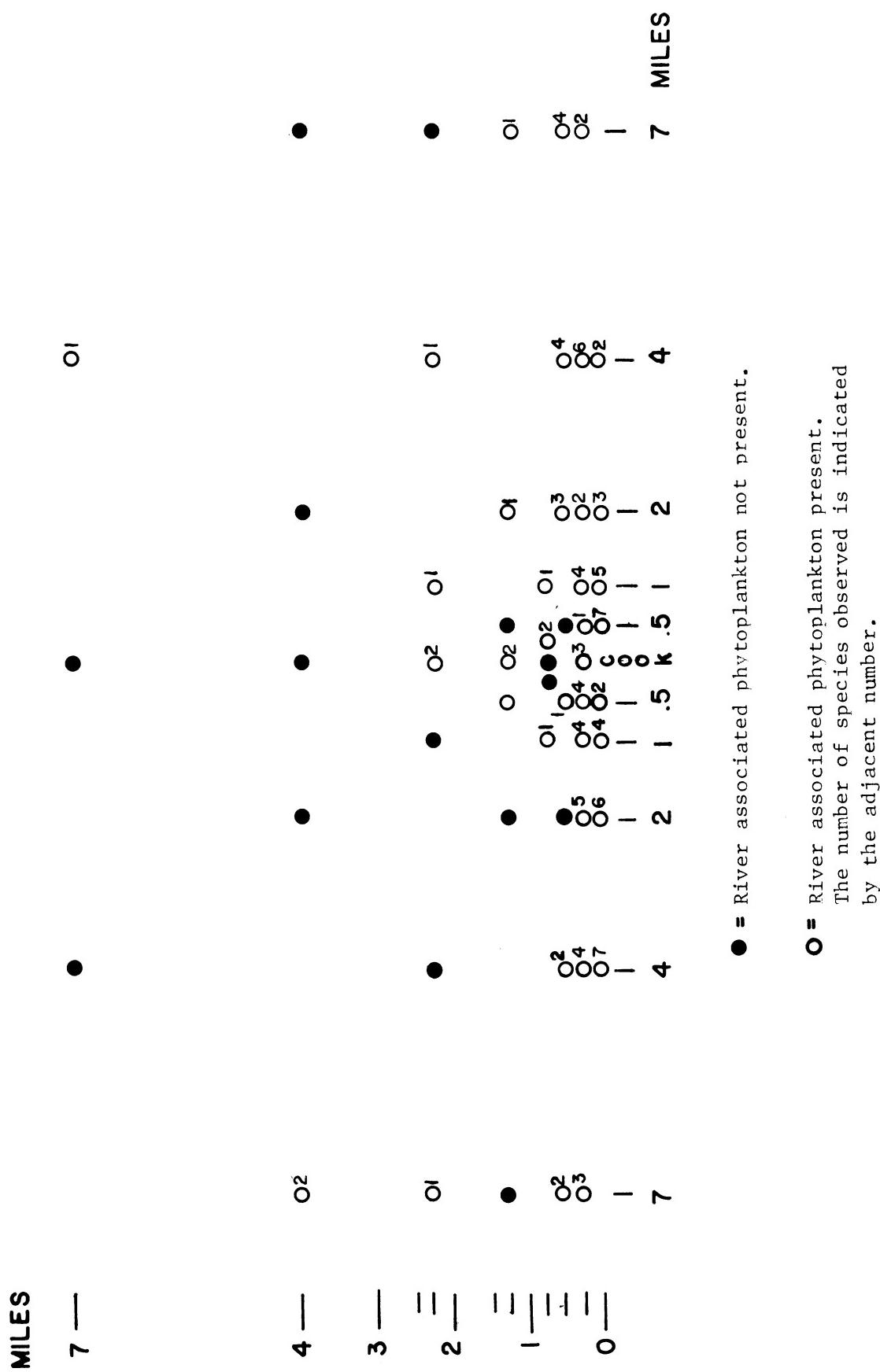


biologically different water masses. This figure will be retained for possible future usefulness.

Possible Influence of the St. Joseph River

Dr. E. F. Stoermer has provided a list of river-associated phytoplankters which he believes would, if heavily dominant in our Cook Plant surveys, indicate an undesirable amount of influence by the St. Joseph River on the environs of the Cook Plant. Our phytoplankton collections at Cook Plant on 10 July 1970 have been inspected for the presence and degree of numerical dominance of these species. In no station did all 13 of the species occur. In 16 of the 54 stations none of the proscribed species occurred. When numbers of these species are plotted on the map of Cook Plant sampling stations (Figure 3), the only pattern that emerges is of their more frequent occurrence in shallow water, not a surprising result since these species also are known as shallow-water lake plankters. Thus, the evidence from the 10 July 1970 survey shows no demonstrable effect of the St. Joseph River on the Cook Plant plankton. Similar analysis will be made for each of the subsequent surveys.

FIGURE 3. Map of Cook Plant Sampling Stations Showing the Distribution of River-Associated Phytoplankton and the Number of Species Present at Each Station.



#### A.5 Study of Zooplankton

##### Zooplankton Techniques

Zooplankton collections were made by a vertical haul, from bottom to surface, with a #5-mesh (0.282-mm average openings) net of .5-m diameter. A propeller-type flowmeter was affixed in the center of the net mouth to obtain quantitative measurement of the volume of water sampled by the net. The volume of water that passed through the net was indicated by the number of revolutions made by the flowmeter propeller; this figure was recorded and later converted to an equivalent expressed in liters of water.

The net was then raised above the surface and rinsed to free organisms impacted on the net and to concentrate the sample in the collecting jar tied on the narrow cod-end of the net. Then, excess water in the brim-full jar was decanted through a small area of the net just above the cod-end. This small area of the net was then rinsed carefully to wash all zooplankters into the collecting jar with a minimum amount of water. The jar was removed from the net, and Koechies fixative, a solution of formalin and sugar, was added as a preservative. An identification label containing pertinent collection data was placed in the jar. The jar was capped and labeled exteriorly for delivery to the laboratory.

In the laboratory, the sample volume was measured by transferring the entire sample to a graduated cylinder. The entire sample then was returned to the collecting jar and mixed thoroughly and continuously with a magnetic stirrer while 1-ml subsamples were extracted with a Henson-Stempel pipette. Each sub-sample was placed in a depression in a clear glass spot plate. Each depression

received a few drops of soap solution to break the surface tension film and allow the zooplankton to settle to the bottom for easier counting. A variable-magnification binocular microscope was used, with transmitted light, for counting and identification. As many 1-ml subsamples as were necessary to obtain good statistical parameters were counted. The number of zooplankton per liter of water was obtained by conversion with standard factors. The station collections of zooplankton on 10 July 1970 are given in Table 7.

#### Zooplankton Abundances

The Cyclopoid copepod zooplankton group exhibited the highest abundances during this survey, reaching 21.99 individuals per liter at station SDC-4-4, 13.52 individuals per liter at station DC-6, and 13.44 individuals per liter at station NDC-4-4; these copepods, however, were not present in the collection from station SDC-4-3. Other maximum abundances during this survey were: Diaptomus copepods, with 12.66 individuals per liter at station SDC-4-4 (this was the highest abundance for this group, greatly exceeding its abundances at other stations); Bosmina cladocerans, with 12.62 individuals per liter at station SDC-2-1 (a single-station maximum approached only by 9.60 individuals per liter at station SDC-7-3); Polyphemus cladocerans, with 2.35 individuals per liter at station DC-1 (at all other stations this group had abundances of less than 1 individual per liter); and Asplanchna rotifers, with 1.42 organisms per liter at station SDC-2-1 (abundances from other stations closely approached this figure). Actual numerical abundances of zooplankton in the collections of this survey indicate primarily the patchiness in spatial distribution of the zooplankton.

In seeking to establish a biological baseline against which future comparisons may be made, we list below the dominance frequencies of the zooplankton groups of the 10 July 1970 survey. Although the Cyclopoid copepods were occasionally present in higher numbers, Bosmina cladocerans dominated the samples most frequently.

<u>Zooplankton Group</u>	<u>Dominant or Codominant Occurrences</u>
Cyclopoid copepods	8
Diaptomus copepods	0
Bosmina cladocerans	37
Polyphemus cladocerans	2
Asplanchna rotifers	0

Just as the phytoplankton samples in the preceding section of this report required that the Cook Plant area of Lake Michigan be put on record as being a "diatom" lake on 10 July 1970, the zooplankton collections of the same day require that the Cook Plant region of the lake be recorded as a "Bosmina" lake.

#### Diversity Indices of the July 1970, and Earlier, Zooplankton Collections

In the preceding section on phytoplankton, we have introduced and discussed the Wilhm and Dorris computation of the diversity index. In this section, their index is applied to the zooplankton collections because it appears to be, at present, the best means by which the zooplankton community can be represented objectively in a way that can be used in watching for changes in community composition over time.

We, at this time at least, attach no pollution-related interpretations to the numbers for diversity indices that are computed. They are used merely as objective parameters against which comparisons over time are to be made.

TABLE 7. Zooplankton, 10 July 1970. Samples by Vertical Haul of Metered #5 Net. Organisms Per Liter.

Organisms \ Stations	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6
<b>Copepods:</b>						
Diaptomus	0.26	0.17	0.26	0.49	1.54	5.02
Epischura	-	-	0.01	0.01	0.01	-
Eurytemora	-	-	-	-	-	-
Limnocalanus	-	-	-	-	-	0.02
Senecella	-	-	-	-	-	-
Cyclopoids	0.05	0.38	0.11	0.79	3.96	13.52
Harpactacoids	-	0.01	-	-	-	-
<b>Cladocerans:</b>						
Alona	-	0.02	-	-	-	-
Bosmina	0.56	1.69	2.49	3.27	1.86	4.61
Ceriodaphnia	-	0.04	-	0.03	0.02	0.02
Daphnia	-	0.02	0.02	0.21	0.17	0.13
Diaphanosoma	-	-	-	-	-	-
Eury cercus	-	-	-	-	-	-
Holopedium	-	0.01	0.02	0.03	-	-
Leptodera	-	0.04	0.01	-	-	-
Polyphe mus	2.35	0.47	0.11	0.14	0.25	0.39
<b>Rotifers:</b>						
Asplanchna	0.42	0.34	0.21	0.14	0.04	0.05

TABLE 7 continued

Organisms	Stations	NDC.25-1	NDC-.5-1	NDC-.5-2	NDC-.5-3	NDC-1-1
<b>Copepods:</b>						
Diaptomus		0.30	0.16	0.22	0.41	0.13
Epischura		-	-	-	-	-
Eurytemora		-	-	-	-	-
Limnocalanus		-	-	-	-	-
Senecella		-	-	-	-	-
Cyclopoids		0.34	0.06	0.24	0.24	0.18
Harpactacoids		-	-	-	0.01	-
<b>Cladocerans:</b>						
Alona		-	0.06	0.02	-	0.03
Bosmina		3.36	1.07	2.20	3.22	1.50
Ceriodaphnia		0.04	-	0.04	0.02	0.03
Daphnia		0.02	-	-	0.04	0.03
Diaphanosoma		-	-	-	-	-
Eury cercus		-	-	-	-	-
Holopedium		-	-	-	0.01	-
Leptodera		-	-	-	0.01	-
Polyphe mus		0.98	0.14	0.82	0.25	0.41
<b>Rotifers:</b>						
Asplanchna		0.68	0.53	0.98	0.23	0.52

TABLE 7 continued

<u>Organisms</u>	<u>Stations</u>	NDC-1-2	NDC-1-3	NDC-2-1	NDC-2-2	NDC-2-3
<b>Copepods:</b>						
Diaptomus		0.27	0.41	2.02	-	0.26
Epischura		-	-	0.02	-	-
Eurytemora		-	-	-	-	-
Limnocalanus		-	-	-	-	-
Senecella		-	-	-	-	-
Cyclopoids		0.24	0.32	4.43	-	0.24
Harpactacoids		-	-	-	-	-
<b>Cladocerans:</b>						
Alona		0.01	0.36	-	-	-
Bosmina		1.58	1.17	4.72	-	2.31
Ceriodaphnia		-	-	0.03	-	0.01
Daphnia		0.02	0.01	0.35	-	0.04
Diaphanosoma		-	-	-	-	-
Eury cercus		-	-	-	-	-
Holopedium		0.01	-	0.01	-	0.02
Leptodera		-	-	0.01	-	0.01
Polyphemus		0.58	0.36	0.06	-	0.31
<b>Rotifers:</b>						
Asplanchna		0.42	0.04	0.13	-	0.32

TABLE 7 continued

Organisms \ Stations	NDC-2-4	NDC-4-1	NDC-4-2	NDC-4-3	NDC-4-4
<b>Copepods:</b>					
Diaptomus	2.02	0.27	0.21	0.51	6.60
Epischura	0.02	0.02	0.02	0.01	0.01
Eurytemora	-	-	-	-	-
Limnocalanus	-	-	-	-	0.03
Senecella	-	-	-	-	-
Cyclopoids	4.43	0.07	0.17	0.70	13.44
Harpactacoids	-	-	-	0.01	-
<b>Cladocerans:</b>					
Alona	-	-	0.01	-	-
Bosmina	4.72	1.96	1.58	1.59	3.77
Ceriodaphnia	0.03	0.02	0.02	0.07	0.02
Daphnia	0.35	0.02	0.01	0.08	0.23
Diaphanosoma	-	-	1.58	-	-
Eurycercus	-	-	0.02	-	-
Holopedium	0.01	0.02	0.02	0.02	0.01
Leptodera	0.01	-	0.01	0.01	-
Polypheus	0.06	0.50	0.11	0.25	0.13
<b>Rotifers:</b>					
Asplanchna	0.13	0.38	0.25	0.24	0.05

TABLE 7 continued

Organisms \ Stations	NDC-7-1	NDC-7-2	NDC-7-3	NDC-7-4	NDC-7-5
<b>Copepods:</b>					
Diaptomus	0.66	1.13	0.81	0.44	0.99
Epischura	-	-	-	0.04	0.03
Eurytemora	-	-	-	-	-
Limnocalanus	-	-	-	-	-
Senecella	-	-	-	-	-
Cyclopoids	1.33	2.02	0.93	0.55	3.19
Harpactacoids	-	-	-	0.01	-
<b>Cladocerans:</b>					
Alona	0.08	0.42	0.14	0.01	-
Bosmina	5.72	4.22	1.62	1.11	1.60
Ceriodaphnia	-	0.07	-	0.04	0.03
Daphnia	0.05	0.13	0.05	0.04	0.14
Diaphanosoma	-	-	-	-	-
Eurycercus	0.05	-	-	0.01	0.01
Holopedium	-	0.05	0.01	0.01	0.01
Leptodera	-	-	0.03	0.01	0.01
Polypheus	0.23	0.15	0.47	0.16	0.10
<b>Rotifers:</b>					
Asplanchna	0.20	0.37	0.29	0.10	0.03

TABLE 7 continued

Organisms \ Stations	SDC-.25-1	SDC-.5-1	SDC-.5-2	SDC-.5-3	SDC-1-1
<b>Copepods:</b>					
Diaptomus	0.37	0.25	0.08	0.60	0.08
Epischura	-	-	-	-	-
Eurytemora	-	-	-	-	-
Limnocalanus	-	-	-	-	-
Senecella	-	-	-	-	-
Cyclopoids	0.48	0.23	0.23	0.38	0.25
Harpactacoids	-	-	-	-	-
<b>Cladocerans:</b>					
Alona	0.04	-	0.02	-	0.06
Bosmina	4.31	4.88	2.25	3.53	3.23
Ceriodaphnia	0.02	-	-	0.07	-
Daphnia	0.08	0.02	-	0.15	-
Diaphanosoma	-	-	-	-	-
Eurycercus	-	-	-	-	-
Holopedium	0.03	-	-	0.03	-
Leptodera	-	0.02	-	0.01	0.03
Polyphemus	0.69	0.18	0.66	0.21	0.45
<b>Rotifers:</b>					
Asplanchna	1.08	0.44	1.26	0.36	0.48

TABLE 7 continued

Organisms \ Stations	SDC-1-2	SDC-1-3	SDC-2-1	SDC-2-2	SDC-2-3
<b>Copepods:</b>					
Diaptomus	0.34	0.68	1.78	0.08	0.35
Epischura	0.05	0.02	0.24	0.04	-
Eurytemora	-	-	-	-	-
Limnocalanus	-	-	-	-	-
Senecella	-	-	-	-	-
Cyclopoids	0.44	0.66	3.44	0.10	0.26
Harpactacoids	-	0.01	-	0.04	0.01
<b>Cladocerans:</b>					
Alona	0.08	0.42	0.18	0.02	0.01
Bosmina	3.93	3.50	12.62	2.24	1.65
Ceriodaphnia	0.03	0.06	0.06	-	0.05
Daphnia	0.03	0.12	0.06	-	0.03
Diaphanosoma	-	-	-	-	-
Eurycercus	-	-	-	-	-
Holopedium	0.09	0.04	-	0.02	0.04
Leptodera	-	0.04	0.12	-	0.05
Polypheus	0.44	0.12	0.47	0.38	0.25
<b>Rotifers:</b>					
Asplanchna	1.20	0.32	1.42	0.50	0.22

TABLE 7 continued

Organisms \ Stations	SDC-2-4	SDC-4-1	SDC-4-2	SDC-4-3	SDC-4-4
<b>Copepods :</b>					
Diaptomus	1.68	0.33	0.08	0.40	12.66
Epischura	0.01	-	0.05	0.04	-
Eurytemora	-	-	-	-	-
Limnocalanus	-	-	-	-	0.09
Senecella	-	-	-	-	-
Cyclopoids	2.59	0.08	0.16	-	21.99
Harpactacoids	-	-	-	0.04	-
<b>Cladocerans :</b>					
Alona	-	-	0.06	-	-
Bosmina	4.75	1.69	1.08	2.74	9.83
Ceriodaphnia	-	-	-	-	-
Daphnia	0.19	0.03	-	0.12	0.35
Diaphanosoma	-	-	-	-	-
Eurycercus	-	-	-	-	-
Holopedium	-	0.02	-	-	-
Leptodera	0.01	-	0.02	0.03	-
Polypheus	0.23	0.14	0.35	0.08	0.18
<b>Rotifers :</b>					
Asplanchna	0.08	0.56	0.32	0.25	0.08

TABLE 7 continued

Organisms	Stations	SDC-7-1	SDC-7-2	SDC-7-3	SDC-7-5
<b>Copepods:</b>					
Diaptomus		0.31	1.05	6.20	1.34
Epischura		0.04	-	0.19	0.03
Eurytemora		-	-	-	-
Limnocalanus		-	-	-	-
Senecella		-	-	-	-
Cyclopoids		0.61	2.73	6.86	2.78
Harpactacoids		-	-	-	0.02
<b>Cladocerans:</b>					
Alona		0.19	0.46	0.20	0.03
Bosmina		3.51	3.97	9.60	1.05
Ceriodaphnia		0.04	-	0.05	-
Daphnia		-	-	0.79	0.14
Diaphanosoma		-	-	-	-
Eury cercus		-	0.03	0.23	-
Holopedium		-	-	0.05	0.02
Leptodera		-	0.06	0.06	0.01
Polyphe mus		3.66	0.99	0.64	0.12
<b>Rotifers:</b>					
Asplanchna		0.15	0.78	0.88	0.07

The diversity indices have been computed from the station collections of 10 July 1970 given in Table 7. Table 8 gives indices computed from earlier collections.

TABLE 8. Diversity Indices of Zooplankton Samples from 1-1.3 Miles Off Cook Plant.

Station and Date	Distance from Shore	Diversity Index
COOK 4 October 1969	1.0 mile	2.0
COOK 26 April 1970	1.0 mile	1.2
COOK 6 June 1970	1.0 mile	1.4
(and, for comparison, from the present report)		
DC-3 10 July 1970	1.25 miles	1.3

Table 9 presents station by station: (1) the dominant organism in terms of numbers in each station collection, (2) the total number of zooplankton organisms per liter captured by the #5 plankton net, and (3) the diversity indices as computed from the data of Table 7. At the end of Table 9 there is presented the overall average diversity index for this day's collections, which is given as a possible summary parameter for the station collections.

#### Comments on the Zooplankton Collections

The numbers of zooplankton per liter found in the water in the Cook Plant area varied considerably. The offshore samples tended to exhibit higher abundances; however, some stations closer to shore produced samples with high abundances of zooplankton. Table 9 lists, by station, the total number of organisms

TABLE 9. The Numerically Dominant Zooplankters, Total Numbers of Zooplankters Per Liter (Metered #5 Net), and Diversity Indices of the 10 July 1970 Collections.

Station	Dominant Organisms	Total Organisms/Liter	Diversity Index
DC-1	<i>Polyphemus</i>	3.64	1.5
DC-2	<i>Bosmina</i>	3.19	2.1
DC-3	<i>Bosmina</i>	3.24	1.3
DC-4	<i>Bosmina</i>	5.11	1.7
DC-5	<i>Cyclopoids</i>	7.85	1.8
DC-6	<i>Cyclopoids</i>	23.76	1.6
NDC-.25-1	<i>Bosmina</i>	5.72	1.8
NDC-.5-1	<i>Bosmina</i>	2.02	1.8
NDC-.5-2	<i>Bosmina</i>	4.52	2.0
NDC-.5-3	<i>Bosmina</i>	4.44	1.3
NDC-1-1	<i>Bosmina</i>	2.83	2.0
NDC-1-2	<i>Bosmina</i>	3.13	2.0
NDC-1-3	<i>Bosmina</i>	2.67	2.2
NDC-2-1	<i>Bosmina &amp; Cyclopoids</i>	11.78	1.8
NDC-2-2	missing		
NDC-2-3	<i>Bosmina</i>	3.52	1.7
NDC-2-4	<i>Bosmina &amp; Cyclopoids</i>	11.78	1.8
NDC-4-1	<i>Bosmina</i>	3.26	1.8
NDC-4-2	<i>Bosmina</i>	2.41	1.8
NDC-4-3	<i>Bosmina</i>	3.13	2.4
NDC-4-4	<i>Cyclopoids</i>	24.29	1.6
NDC-7-1	<i>Bosmina</i>	8.32	1.5
NDC-7-2	<i>Bosmina</i>	8.19	2.6
NDC-7-3	<i>Bosmina</i>	4.35	2.4
NDC-7-4	<i>Bosmina</i>	2.53	2.3

TABLE 9 continued

Station	Dominant Organisms	Total Organisms/Liter	Diversity Index
NDC-7-5	Cyclopoids	6.14	1.8
SDC-.25-1	Bosmina	7.10	1.8
SDC-.5-1	Bosmina	6.04	1.1
SDC-.5-2	Bosmina	4.50	1.8
SDC-.5-3	Bosmina	5.34	1.7
SDC-1-1	Bosmina	4.52	1.4
SDC-1-2	Bosmina	6.58	1.9
SDC-1-3	Bosmina	5.57	1.8
SDC-2-1	Bosmina	20.39	1.8
SDC-2-2	Bosmina	3.42	1.0
SDC-2-3	Bosmina	2.92	2.1
SDC-2-4	Bosmina	9.54	1.8
SDC-4-1	Bosmina	2.85	1.7
SDC-4-2	Bosmina	2.12	2.1
SDC-4-3	Bosmina	3.43	1.4
SDC-4-4	Cyclopoids	45.18	1.6
SDC-7-1	Polyphemus & Bosmina	8.51	1.8
SDC-7-2	Bosmina	10.04	2.2
SDC-7-3	Bosmina	25.75	2.0
SDC-7-4	broken		
SDC-7-5	Cyclopoids	5.61	1.9
Overall Average Diversity Index			1.8

per liter for each sample. Zooplankton patchiness is evident, although not as pronounced as the phytoplankton patchiness. We cite stations NDC-2-1, NDC-2-4, DC-6, NDC-.5-1, SDC-2-1, SDC-2-2, SDC-2-3, and SDC-2-4 as examples.

#### A.7 Study of Benthic Organisms

##### Benthos Techniques

Benthic organisms were collected by use of the ponar grab-sampler. Two grabs were combined and passed together through a washing device in which the benthic organisms were retained on a 0.5-mm mesh screen. In subsequent counting, the counts were divided by two to give the average of the duplicate samples. Organisms from the washing device then were collected into pint mason jars, labeled internally and externally, preserved with buffered formalin, and returned to the laboratory for processing. In the laboratory, the samples were concentrated on a small mesh net, and transferred with minimum fluid to the counting tray.

For general survey purposes, the benthos are counted into the groups: amphipods, oligochaetes, sphaeriids, chironomids, and others (mostly leeches and snails). The averaged counts were converted by standard factors to give numbers of organisms per square meter. The counted samples are preserved by appropriate standard museum techniques and retained as a reference collection.

We are well aware of some weaknesses in our treatment of benthos collections. We know that sorting and counting into family groups as outlined above is a compromise between the desirable identification to species and the time-wise impracticality of such identifications to species. For the same reason, another compromise has been necessary to expedite enumeration of the oligochaetes. These worms tend to fragment during processing, and it is not possible to rapidly distinguish fragments from whole individuals. Therefore, to estimate oligochaete abundance, all worms and parts of worms were counted, and the total

divided by three. More detailed examination of some samples has shown that this factor actually varies from sample to sample, but we feel that our procedure is adequate to distinguish any major features of oligochaete distribution. We have tried the computation of diversity indices from our higher-taxon separation of benthos, and have found that they are unrealistic; diversity indices will not be applied to our benthos collections for this reason. In view of the necessity to maintain continuity of method, we will retain the benthos-handling routine outlined in the preceding paragraphs.

#### Benthos Abundances

The abundances of benthic organisms collected on 10 July 1970 are presented in Table 10. In this table the collections are arranged into six parts, each of which contains stations at different distances from shore and in roughly the same water depths. Location of stations by distance from shore is navigationally convenient and desirable. It bears upon biological collections through its effect upon water depth, which in turn bears upon biota through its effects on wave action, bottom stability, food materials remaining in the area, and other factors. The bottom in the area of Cook Plant is gently, but not uniformly, sloping and its sand is known to move with storms and currents. Because of this, the variations of depth at given distances from shore contain transient factors due to bottom movement. The two deepest stations were characterized by fine sediments with a high proportion of clay, indicating the occurrence of a sedimentation boundary at approximately 130 ft.

As a whole, benthic macrofauna increased strongly with depth between 15 and 80 ft. This was also true of the major taxa amphipods (represented by the single

TABLE 10. The Benthos Collections of 10 July 1970. Numbers Per Meter<sup>2</sup>.

Station	Depth (ft)	Amphipods	Oligochaetes	Sphaeriids	Chronomids	Others
<i>Part 1. Stations 1/4 Mile Offshore</i>						
NDC-7-1	22	8	17	0	86	8L
NDC-4-1	17.5	0	0	0	295	0
NDC-2-1	18.5	0	0	0	no data	0
NDC-1-1	18.5	0	17	0	504	0
NDC-.5-1	20.5	0	26	0	113	0
DC-1	19	86	399	8	452	17L
SDC-.5-1	19.5	0	0	0	226	0
SDC-1-1	13.5	0	0	0	278	0
SDC-2-1	18	0	17	0	660	0
SDC-4-1	14	8	0	0	95	0
SDC-7-1	14	26	8	0	86	0
<i>Averages</i>		11.6	44	0.7	254	2.3
<i>Part 2. Stations 1/2 and 3/4 Mile Offshore</i>						
NDC-7-2	27.5	86	982	69	86	17L
NDC-4-2	29	339	521	165	147	0
NDC-2-2	21.5		missing			
NDC-1-2	33.5*	747	1,817	321	113	8L
NDC-.5-2	26.5		missing			
DC-2	40.5*	1,582	547	243	147	0
SDC-.5-2	28.5	156	686	113	60	8S
SDC-1-2	40*	1,417	2,556	730	243	34L
SDC-2-2	27.5	121	843	139	165	0
SDC-4-2	37.5	95	765	78	269	0
SDC-7-2	26.5	139	1,104	121	147	8S
<i>Averages</i>		520	1,091	220	153	8.3

\* 3/4 mile offshore.

TABLE 10 continued

Station	Depth (ft)	Amphipods	Oligochaetes	Sphaeriids	Chronomids	Others
<i>Part 3. Stations 1 1/4 Miles Offshore</i>						
NDC-7-3	48	556	573	26	43	8L
NDC-2-3	51	139	1,104	34	34	8L
NDC-.5-3	56.5	78	3,738	1,886	104	17S 52L
DC-3	56.5	5,382	860	956	121	0
SDC-.5-3	54.5	2,278	2,608	217	34	17L
SDC-2-3	51.5	721	8,781	921	69	17L
SDC-7-3	51.5	1,704	660	104	130	0
<b>Averages</b>		<b>1,550</b>	<b>2,618</b>	<b>592</b>	<b>76</b>	<b>17</b>
<i>Part 4. Stations 2 1/4 Miles Offshore</i>						
NDC-7-4	52.5	495	78	34	0	0
NDC-4-3	55.5	1,973	78	34	43	0
NDC-1-3	57.5	4,243	3,199	1,982	513	104L 43S
DC-4	65.5	695	3,869	2,634	486	208L
SDC-1-3	61.5	3,756	1,165	652	130	52L
SDC-4-3	59.5	547	2,825	921	78	52L 43S
SDC-7-4	53.5	4,573	1,747	226	0	8L
<b>Averages</b>		<b>2,326</b>	<b>1,852</b>	<b>926</b>	<b>179</b>	<b>73</b>
<i>Part 5. Stations 4 Miles Offshore</i>						
NDC-7-5	71.5	1,843	5,695	1,121	252	78L
NDC-2-4	74.5	10,451	6,008	278	52	0
DC-5	79.5	7,668	4,590	704	43	26L
SDC-2-4	72.5	2,825	4,617	1,356	286	34L
SDC-7-5	70.5	2,425	2,825	947	295	95L
<b>Averages</b>		<b>5,042</b>	<b>4,747</b>	<b>881</b>	<b>186</b>	<b>47</b>

TABLE 10 continued

Station	Depth (ft)	Amphipods	Oligochaetes	Sphaeriids	Chronomids	Others
<i>Part 6. Stations 7 Miles Offshore</i>						
NDC-4-4	134.5	5,208	5,686	617	104	34M
DC-6	130.5	939	1,365	147	34	17L
SDC-4-4	102.5	1,199	5,625	573	52	34L 17S
Averages		2,449	4,225	446	63	34

species Pontoporeia affinis), oligochaetes, and sphaeriids. Chironomids were present in low abundance over much of the area, and dominated the benthos in depths less than about 20 ft.

On 10 July 1970, the water depths at 1/4 mi from shore were slightly deeper directly in front of the plant site. This condition was reflected in higher (but still low) benthos collections directly in front of the plant site (see station DC-1 collections in comparison to collections at adjacent NDC stations north and SDC stations south of the plant site). To a lesser extent, this condition is shown also in Part 2 of Table 10, though it should be noted that stations NDC-1-2, DC-2, and SDC-1-2 were at 3/4 mi from shore, while the rest were at 1/2 mi. The tendency for deeper water and higher collections continues to be evident through Part 5 of the table, which presents station collections at 4 mi from shore. It is not present in Part 6, which gives collections at 7 mi from shore. At present we do not know whether the increased depth in front of the plant site is a temporary feature due to transient conditions of bottom movement or a permanent feature.

In spite of the deeper water in front of the plant site, the benthos collections at 1/4 mi from shore clearly demonstrate a relatively sterile zone or relative biological desert there, populated mainly by chironomids. If the Cook Plant outfalls go in at the planned 1160 ft from shore, they will be in this relatively deserted zone, where there is little benthos to be damaged. If the outfalls were to be placed at 1/2 mi from shore, they still would be in an area of reduced benthos.

### The Benthos Species List

Detailed study of the benthos reference collection from this survey has been carried out and the list of resident benthos of that day has been prepared. It is presented in Table 11. Altogether, 38 kinds of benthic macrofauna were distinguished, and many of these were identified to the species level, or larval type in the case of chironomids. The only animal listed as a single taxon, but which included several species, is Pisidium.

Comparisons of the types of chironomids and oligochaetes with other areas of the Great Lakes revealed a mixture of "oligotrophic" and "eutrophic" conditions (as defined by indicator species) in the Cook Plant area during this survey. Future publications will deal with these relationships.

Application of the diversity index to the samples provided no additional insight into the ecology of the area, for the values varied so much that their significance was ambiguous. The cause of many of the low diversity values was the high proportion of Pontoporeia in the samples.

TABLE 11. Species List, Cook Plant Benthos Survey  
July 1970

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Arthropoda

Crustacea

Amphipoda

Pontoporeia affinis

Mysidacea

Mysis relicta

Insecta

Diptera

Chironomidae (larval types, not species)

Chironomus fluviatilis-group

C. anthracinus-group

C. halophilus-group

Kiefferulus sp.

Cryptochironomus sp. 1

C. sp. 2

Parachironomus cfr. demeijerei

Paracladopelma cfr. galaptera

P. cfr. obscura

Polypedilum cfr. scalaenum

P. fallax-group

Tanytarsini sp.

Procladius sp. (?spp.)

Monodiamesa cfr. bathyphila

Heterotrissocladius cfr. subpilosus

Annelida

Oligochaeta

Lumbriculiidae

Stylodrilus herringianus

Tubificidae

Limnodrilus hoffmeisteri

L. angustipenis

L. cervix

TABLE 11 continued

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	<u>L. profundicola</u>
	<u>Aulodrilus americanus</u>
	<u>Potamothrix moldaviensis</u>
	<u>P. vejdovskyi</u>
	<u>Peloscolex freyi</u>
	<u>P. variegatus</u>
	<u>Tubifex tubifex</u>
Hirudinea	
	<u>Helobdella stagnalis</u>
	<u>Glossiphonia complanata</u>
Mollusca	
Pelecypoda	
	Sphaeriidae
	<u>Sphaerium striatinum</u>
	<u>S. corneum</u>
	<u>S. nitidum</u>
	<u>S. transversum</u>
	<u>Sphaerium sp.</u>
	<u>Pisidium spp.</u>
Gastropoda	
	<u>Lymnaea sp.</u>
	<u>Valvata sp.</u>

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**Appendix A**

**PHYSICAL MEASUREMENTS, 10 JULY 1970**

<u>Station</u>	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	NDC-.25-1	NDC-.5-1
<u>Time, EST</u>	1508	1456	1523	1537	1557	1623	1454	
<u>Wind Direction</u>			NW		NW			
<u>Wind Speed</u>			7 knots		9 knots	9 knots		
<u>Sea Height, ft</u>			2 ft		2 ft	2 ft		
<u>Weather</u>			partly cloudy hazy		partly cloudy hazy	partly cloudy hazy		
<u>Secchi Disc</u>	3.2	3.9	4.0	3.8	4.8	8.0	3.8	1.7
<u>Water Color</u>	slightly milky brownish green	milky blue green	clear blue green	slightly milky brownish green	milky light green			
<u>Surface Water Temperature, °C</u>	20.9°C	20.9°C	20.9°C	20.7°C	20.2°C	19.6°C	21.3°C	19.7°C
<u>Water Depth, ft</u>	19.0 ft	40.5 ft	56.5 ft	65.5 ft	79.5 ft	130.5 ft	38.0 ft	20.5 ft
<u>Bottom Type</u>	silty fine brown sand	silty fine brown sand	silty fine brown sand	half inch tan clayey fine sand over gray clayey fine sand	medium speckled brown sand	soft sandy clay	silty fine brown sand	silty coarse brown sand

## Appendix A continued

<u>Station</u>	NDC-.5-2	NDC-.5-3	NDC-1-1	NDC-1-2	NDC-1-3	NDC-2-1	NDC- 2-2	NDC-2-3
<u>Time, EST</u>	1419	1431	0942	1340	1400	0951	1234	1248
<u>Wind Direction</u>					NW			
<u>Wind Speed</u>					9 knots			
<u>Sea Height, ft</u>								
<u>Weather</u>						partly cloudy hazy		
<u>Secchi Disc</u>	3.8	4.0	1.25	2.8	4.5	2.0	2.8	4.5
<u>Water Color</u>	milky blue green	slightly milky blue green	milky brownish green	slightly milky blue green	milky brownish green	milky light green	milky blue green	slightly milky blue green
<u>Surface Water Temperature, °C</u>	20.5°C	20.8°C	19.9°C	20.5°C	20.2°C	19.8°C	20.4°C	20.4°C
<u>Water Depth, ft</u>	26.5 ft	56.5 ft	18.5 ft	33.5 ft	57.5 ft	18.5 ft	21.5 ft	51.0 ft
<u>Bottom Type</u>	silty fine brown sand	clayey silty fine brown sand	silty brown coarse sand	silty fine sand	half inch tan clayey fine silty sand with inclusions of gray "organic" material	silty medium sand	hard unable to sample abundant periphyton	silty coarse sand and pebbles

Appendix A continued

<u>Station</u>	NDC-2-4	NDC-4-1	NDC-4-2	NDC-4-3	NDC-4-4	NDC-7-1	NDC-7-2	NDC-7-3
<u>Time, EST</u>	1312	1015	1050	1100	1137	2317	2326	
<u>Wind Direction</u>	NW	NW				NW		
<u>Wind Speed</u>	10 knots	11 knots				8 knots		
<u>Sea Height, ft</u>	2 ft	1 ft				2 ft		
<u>Weather</u>	overcast					partly cloudy		
	hazy					hazy		
	cool					cool		
<u>Secchi Disc</u>	5.5	1.5	2.3	4.2	6.5			
<u>Water Color</u>	slightly milky	milky brownish	slightly milky	slightly milky	clear blue			
	blue	green	brownish	blue	green			
	green	green	green	green				
<u>Surface Water Temperature, °C</u>	19.3 °C	19.9 °C	19.9 °C	19.9 °C	19.6 °C	20.8 °C	20.6 °C	20.2 °C
<u>Water Depth, ft</u>	74.5 ft	17.5 ft	29.0 ft	55.5 ft	134.5 ft	14.0 ft	27.5 ft	48.0 ft
<u>Bottom Type</u>	silty	silty	silty	silty	gelatinous	silty	silty	silty
	fine	medium	fine	fine	soft	coarse	fine	coarse
	brown	brown	brown	brown	gray	brown	brown	and
	sand	sand	with sand	sand	sand	gritless	sand	fine
			few		clay		sand	sand
					granules			

## Appendix A continued

<u>Station</u>	NDC-7-4	NDC-7-5	SDC-.25-1	SDC-.5-1	SDC-.5-2	SDC-.5-3	SDC-1-1	SDC-1-2
<u>Time, EST</u>	2350	0008	1710	0908	1718	1735	0855	1747
<u>Wind Direction</u>								
<u>Wind Speed</u>								
<u>Sea Height, ft</u>								
<u>Weather</u>								
<u>Secchi Disc</u>	3.8	1.7	3.5	3.2	1.7	4.0		
<u>Water Color</u>	milky brownish green	milky light green	milky brownish green	milky brownish green	milky light green	milky brownish green	milky brownish green	milky brownish green
<u>Surface Water Temperature, °C</u>	20.6°C	19.6°C	20.8°C	19.9°C	20.8°C	21.0°C	19.8°C	21.0°C
<u>Water Depth, ft</u>	52.5 ft	71.5 ft	49.5 ft	19.5 ft	28.5 ft	54.5 ft	13.5 ft	40.0 ft
<u>Bottom Type</u>	silty medium sand	half inch tan clayey fine sand	silty fine brown sand	slightly silty coarse brown sand	silty fine brown gray sand	silty fine brown sand with gray	slightly silty fine brown sand with gray	silty fine brown sand inclusions

Appendix A continued

<u>Station</u>	SDC-1-3	SDC-2-1	SDC-2-2	SDC-2-3	SDC-2-4	SDC-4-1	SDC-4-2	SDC-4-3
<u>Time, EST</u>	1803	0835	1822	1836	1859	0815	1930	1949
<u>Wind Direction</u>				NW		NW		NW
<u>Wind Speed</u>				7 knots		7 knots		4 knots
<u>Sea Height, ft</u>				2 ft		1 ft		
<u>Weather</u>				overcast hazy		overcast hazy		overcast hazy
<u>Secchi Disc</u>	3.0	1.6	3.8	3.5	6.0	2.0	too dark	too dark
<u>Water Color</u>	milky brownish green	milky light green	milky brownish green	milky brown green	clear blue green	milky light green	milky green	milky brownish green
<u>Surface Water Temperature, °C</u>	20.8°C	20.0°C	21.2°C	20.9°C	20.9°C	19.0°C	20.2°C	21.0°C
<u>Water Depth, ft</u>	61.5 ft	18.0 ft	27.5 ft	51.5 ft	72.5 ft	14.0 ft	37.5 ft	59.5 ft
<u>Bottom Type</u>	quarter inch	silty fine brown	silty fine brown	silty fine sand	half inch tan	clean coarse brown	silty fine brown	half inch tan
	tan	speckled sand	with sand	silt with gray	silt fine gray	speckled sand	sand	clayey fine over
	silt	gray clayey	fine sand	gray fine sand	fine over sand	gray fine inclusions	sand	gray clayey fine sand

Appendix A continued

<u>Station</u>	SDC-4-4	SDC-7-1	SDC-7-2	SDC-7-3	SDC-7-4	SDC-7-5
<u>Time, EST</u>	2023		2139	2127	2112	
<u>Wind Direction</u>						
<u>Wind Speed</u>						
<u>Sea Height, ft</u>						
<u>Weather</u>						
<u>Secchi Disc</u>	too dark				too dark	too dark
<u>Water Color</u>	too dark				too dark	too dark
<u>Surface Water Temperature, °C</u>	19.6°C	21.5°C	21.4°C	21.0°C	20.8°C	19.8°C
<u>Water Depth, ft</u>	102.5 ft	14.0 ft	26.5 ft	51.5 ft	53.5 ft	70.5 ft
<u>Bottom Type</u>	half inch tan clayey fine sand over gray clayey fine sand	silty fine brown sand				
						with gray fine sand inclusions

## Appendix B

## PHYTOPLANKTON COLLECTIONS, 10 JULY 1970

Identification of Plate Components

Top line (left to right):

Station number, number of species or groups, total number of individuals per milliliter, and the diversity index of the collection.

Columns (left to right):

First . . . . . Names of species or groups collected.

Second . . . . . Numbers of individuals of each species or group, per milliliter.

Third . . . . . Percentages of the total individuals that are represented by the individuals of each species or group. These are the  $N_1/N$  factors used in the diversity index equation.

NDC-4-1	46	3024	3.89	<i>CHROOCOCCUS LIMNETICUS</i>	2
				<i>FRAGILARIA CAPICINA</i>	4
DC-4-1	30	1056	4.013	<i>TABELLARIA FENESTRATA</i>	0.13
				<i>CYCLOTELLA MENEGHINIANA</i>	9.45
DC-4-1	143	143	7.70	<i>STEPHANODISCUS SP.</i>	286
				<i>OCYCTIS SP.</i>	325
DC-4-1	41	41	2.20	<i>DICTYOSPHAERIUM PULCHELLUM</i>	10.74
				<i>DINOBRYON DIVERGENS</i>	10.74
DC-4-1	18	18	0.96	<i>PERIDINIUM SP.</i>	3.83
				<i>MELOSIRA GRANULATA</i>	1.16
DC-4-1	74	74	3.98	<i>MELOSIRA GRANULATA V. ANGUSTISSIMA</i>	1.50
				<i>MELOSIRA ITALICA</i>	12.89
DC-4-1	219	11.79	11.79	<i>FRAGILARIA CROTONENSIS</i>	0.79
				<i>ANKISTRODESmus FALCATUS</i>	5.95
DC-4-1	56	3.01	3.01	<i>PEDIASTRUM SP.</i>	1.80
				<i>SCENEDESMUS OPOLIENSIS</i>	1.6
DC-4-1	122	57	57	<i>SCENEDESMUS INCRASSATULUS</i>	0.33
				<i>SCENEDESMUS SP.</i>	4
DC-4-1	56	56	56	<i>SCENEDESMUS QUADRIGULA</i>	0.13
				<i>SPORES</i>	10
DC-4-1	22	1.18	1.18	<i>NITZSCHIA SP.</i>	2.97
				<i>NAVICULA SP.</i>	456
DC-4-1	67	3.60	3.60	<i>SYNEDRA ULNA</i>	12.89
				<i>SYNEDRA ACUS</i>	24
DC-4-1	37	1.99	1.99	<i>GLENKINIA RADIATA</i>	0.79
				<i>DINOFLAGELLATE CYSTS</i>	50
DC-4-1	29	3.17	3.17	<i>MOUCHEOTIA SP.</i>	1.65
				<i>ANABAENA CIRCINALIS</i>	4
DC-4-1	11	0.59	0.59	<i>GLOEOPHYTIS SP.</i>	0.26
				<i>MALLOMONAS SP.</i>	0.26
DC-4-1	33	1.77	1.77	<i>CRYPTOMONAS SP.</i>	0.26
				<i>FAGILARIA INTERMEDIA</i>	0.26
DC-4-1	18	0.96	0.96	<i>DIATOMA TENUIS V. ELONGATUM</i>	0.26
				<i>CRUCIGENIA QUADRATA</i>	0.26
DC-4-1	7	0.37	0.37	<i>ASTERIONELLA FORMOSA</i>	0.26
				<i>MELOSIRA BINDERANA</i>	0.26
DC-4-1	26	1.40	1.40	<i>UNKNOWN CELLS</i>	0.26
				<i>FRAGILARIA CONSTRUENS</i>	372
DC-4-1	274	14.76	14.76	<i>LAGHERHEIMIA CITRIFCRVIS</i>	12.30
				<i>SURIRELLA SP.</i>	24
DC-4-1	22	1.18	1.18	<i>AMPHIPORA ORNATA</i>	0.79
				<i>SYNEDRA ULNA V. DANICA</i>	2
DC-4-1	297	16.00	16.00	<i>AMPHIPORA SP.</i>	0.06
				<i>COELOSPHELIUM SP.</i>	4
DC-4-1	7	0.37	0.37	<i>CHLAMYDOMONAS SP.</i>	0.06
				<i>FRANCEIA DROESCHERI</i>	4
DC-4-1	18	0.59	0.59	<i>COELOSPHELIUM SP.</i>	0.06
				<i>CHLAMYDOMONAS SP.</i>	18
DC-4-1	4	4	4	<i>FRANCEIA DROESCHERI</i>	4
				<i>FRANCEIA DROESCHERI</i>	13

## Appendix B continued

Appendix B continued

	NDC-7-1	46	1994	3.78	NDC-7-2	50	11523	1.09
CLOSTERIOPSIS LONGISSIMA	2	0.10			TETRAEDRON OBESUM	40		0.34
SCENEDESMUS BIJUGA	4	0.20			SYNEDRA ULNA V. CHAESANA	1	0.00	
COELASTRUM SPHERICUM	18	0.90			FRAGILARIA CAPUCINA	2	0.01	
CHLAMUDOMAS SP.	138	6.92			AMPHORA OVALIS	1	0.00	
OOCYSTIS SP.	10	0.50			MALLOMONAS SP.	7	0.06	
CYCLOTELLA SP.	314	15.74			GREEN CELLS	86.55		
PERIDINUM SP.	56	2.80			CRYPTOMONAS SP.	80	0.69	
TABELLARIA FEMESTRATA	164	8.22			OOCYSTIS SOLITARIA	51	0.44	
SCENEDESMUS ACUMINATUS	2	0.10			CYCLOTELLA MENEGHINIANA	249	2.16	
CHLAHYDOMONAS SP.	13	0.65			TABELLARIA FEMESTRATA	209	1.81	
CLOSTERIOPSIS LONGISSIMA	2	0.10			CHLAMYDOMONAS SP.	8	0.06	
SCENEDESMUS BIJUGA	4	0.20			DINOBYRON DIVERGENS	39	0.33	
COELASTRUM SPHERICUM	18	0.90			ANKISTODESMUS FALCATUS	8	0.06	
CRYPTOMONAS SP.	138	6.92			NITZSCHIA SP.	18	0.15	
OOCYSTIS SP.	81	4.06			COELASTRUM Sphaericum	4	0.03	
DINOFLAGELLATE CYSTS	2	0.10			SCENEDESMUS QUADRICAUDA	6	0.05	
FRAGILARIA INTERMEDIA	11	0.55			SCENEDESMUS OPOLIENSIS	2	0.01	
MELOSIRA ISLANDICA	190	9.52			SCENEDESMUS DIMORPHUS	4	0.13	
MELOSIRA ITALICA	325	16.29			SCENEDESMUS ABUNDANS	2	0.01	
DICTYOSPHAERIUM PULCHELLUM	54	2.70			QUADRIGULA CHODATII	2	0.01	
FRAGILARIA CROTONENSIS	29	1.45			PERIDIUM SP.	17	0.32	
ANKISTODESMUS FALCATUS	14	0.70			GLENODIUM SP.	4	0.03	
CLOSTERIUM SP.	1	0.05			FRANCIA OVALIS	2	0.01	
PEDIASTRUM DUPLEX	2	0.10			CLOSTERIUM SP.	1	0.00	
NAVICULA SP.	3	0.15			NAVICULA SP.	6	0.05	
AMPHORA SP.	4	0.20			COSMARIA SP.	5	0.04	
DINOBYRON DIVERGENS	20	1.00			DINOFLAGELLATE CYSTS	8	0.06	
TETRAEDRON LUTEA	2	0.10			ANABENA CIRCINALIS	24	0.20	
TETRAEDRON PEPTAEDRICUM	1	0.05			CLOSTERIUM SP.	3	0.02	
TETRAEDRON MINIMUM	4	0.20			KIRCHNERIELLA SP.	1	0.00	
NITZSCHIA SP.	18	0.90			CERATUM HIRUNDINELLA	2	0.01	
SCENEDESMUS QUADRICAUDA	14	0.70			DICTYOSPHAERIUM PULCHELLUM	85	0.73	
SCENEDESMUS ABUNDANS	9	0.45			OOCYSTIS BORGII	25	0.21	
SCENEDESMUS OPOLIENSIS	4	0.20			PRAGIARIA INTERMEDIA	17	0.14	
COSMARIA SP.	5	0.25			PRAGIARIA CROTONENSIS	68	0.59	
CHROOCCUS SP.	2	0.10			CRUCIGENIA SP.	2	0.01	
CRUCIGENIA QUADRATA	1	0.05			MELOSIRA GRANULATA V. ANGUSTISSIMA	274	2.37	
ANABAENA CIRCINALIS	5	0.25			MELOSIRA ISLANDICA	152	1.31	
HOGGOTIA SP.	3	0.15			SCHRODERIA JUDAYI	1	0.00	
LAGENHEIMIA LONGISETA	2	0.10			NAVICULA GASTRUM	70	0.60	
GREEN COLONY UNKNOWN	6	0.30			GLOBOCYSTIS SP.	6	0.05	
SYNEDRA ULNA V. DANICA	1	0.05			TETRAEDRON MINIMUM	2	0.01	
QUADRIGULA LACISTRIS	1	0.05			TETRAEDROM SMITHII	9	0.07	
STAURASTRUM SP.	1	0.05			TETRAEDROM WISCONSINENSIS	1	0.00	
GREEN CELLS	1	0.05			TRIBONEMA SP.	1	0.01	
	14.79				PEDASTRUM DUPLEX	1	0.00	
	295				HOUGBOTIA SP.	1	0.00	
					NEPHROCYTUM SP.	1	0.00	
					SPORES RESTING	6	0.05	

## Appendix B continued

	NDC-7-3	1081	41	3.92	NDC-7-4	17	1344	2.77
NAVICULA SP.	2	0.18	OOCYSTIS SP.	16	1.19			
AMPHORA OVALIS	1	0.09	CRYPTOMONAS SP.	36	2.67			
CLOSTERIUM SP.	3	0.27	ANABAENA CIRCINALIS	32	2.38			
PERIDINIUM SP.	50	4.62	PERIDINIUM SP.	48	3.57			
CHLAMYDOMONAS SP.	18	1.66	TABELLARIA PENESTRATA	348	25.89			
CHLAMYDOMONAS SP.	139	12.85	WESTELLA SP.	244	18.15			
TABELLARIA PENESTRATA	36	3.33	GREEN CELLS	416	30.95			
OOCYSTIS SP.	47	4.34	CHLAMYDOMONAS SP.	20	1.48			
CRYPTOMONAS SP.	149	13.78	DINOBRYON DIVERGENS	28	2.08			
CYCLOTELLA SP.	8	0.74	SCENEDESMUS OPOLIENSIS	4	0.29			
NITZSCHIA SP.	8	0.74	PRAGILARIA CAPUCINA	16	1.19			
ANKISTODESMUS FALCATUS	1	0.09	SCENEDESMUS QUADRICAUDA	4	0.29			
FRANCEA DROESCHERI	2	0.18	SCENEDESMUS ABUNDANS	4	0.29			
PEDIASTHEUM DUPLEX	2	0.18	FRANCEA DROESCHERI	4	0.29			
NEPHROCYTUM SP.	2	0.18	PRAGILARIA CROTONENSIS	16	1.19			
SCENEDESMUS QUADRICAUDA	8	0.74	TETRAEDRON MINIMUM	8	0.59			
SCENEDESMUS BIJUGA V. ALTERNAENS	1	0.09	GREEN COLONY UNKNOWN	100	7.44			
SYNEDRA ULNA V. DANICA	2	0.18						
PRAGILARIA CONSTRICTA	8	0.74						
QUADRIGULA LACustris	1	0.09						
SCENEDESMUS ABUNDANS	1	0.09						
STAURSTRUM SP.	1	0.09						
COBLASTIUM SPHAERICUM	3	0.27	NDC-7-5	21	2.20	3.29		
DICTYOSPHAERIUM PULCHELLUM	7	0.64	CLOSTERIUM SP.	2	0.90			
COSMARIA SP.	3	0.27	HALLONAS SP.	3	1.36			
ANABAENA CIRCINALIS	26	2.40	CYCLOTILLA SP.	2	0.90			
DINOFLAGELLATE CISTS	4	0.37	MOUGETIA SP.	1	0.45			
TETRAEDRON MINIMUM	3	0.27	DINOBRYON DIVERGENS	16	7.27			
ASTERIONELLA FORIOSA	2	0.18	PRAGILARIA CROTONENSIS	28	12.72			
PRAGILARIA INTERMEDIA	6	0.55	DINOFLAGELLATE CISTS	3	1.36			
MELOSIRA ISLANDICA	115	10.63	CERATIUS HIRUNDINELLA	1	0.45			
MELOSIRA GRANULATA V. ANGUSTISSIMA	82	7.58	KIRCHNERIELLA SP.	1	0.45			
MELOSIRA ITALICA	34	3.14	GLEMONIDIUM SP.	8	3.63			
TETHADESMUS SMITHII	2	0.18	PERIDINIUM SP.	16	7.27			
LAGERHEIMIA LONGISETA	4	0.37	ZOOSPORES	12	5.45			
GLOEOCYSTIS SP.	9	0.83	CHLAMYDOMONAS SP.	8	3.63			
AERIDION CIRCULARE	1	0.09	OOCYSTIS SOLITARIA	10	4.54			
SCENEDESMUS OPOLIENSIS	1	0.09	ANABAENA CIRCINALIS	14	6.36			
SYNEDRA ACUS	2	0.18	TABELLARIA PENESTRATA	80	36.36			
PRAGILARIA CAPUCINA	33	3.05	CRYPTOMONAS SP.	6	2.72			
PRAGILARIA CROTONENSIS	163	15.07	LAGHERHEIMIA CITRIIFORMIS	1	0.45			
DINOBRYON DIVERGENS	93	8.60	TETRAEDRON MINIMUM	3	1.36			
ASTERIONELLA FORIOSA			ANKISTODESMUS FALCATUS	1	0.45			
			ASTERIONELLA FORIOSA	4	1.81			

Appendix B continued

SPEC-25-1	9	143	1.94	SPEC-5-1	33	718	3.62
DINOBRYON DIVERGENS	3	2.09	TABELLARIA FENESTRATA	153	21.30		
TARCELLARIA FENESTRATA	75	52.44	CHLADOMONAS SP.	15	2.08		
PERIDINIUM SP.	28	19.58	PERIDINIUM SP.	32	4.45		
MICROSTIS SP.	3	2.09	ANAFENA CIRCINALIS	21	2.92		
ANAFENA SP.	5	3.49	CYCLOTFILA SP.	78	10.86		
MONIFERTA SP.	1	0.69	DINOBRYON DIVERGENS	39	5.43		
TETRAFRON MINIMUM	1	0.69	MEPHANCYTUM SP.	2	0.27		
FRAGILARIA CROTONEENSIS	26	18.18	OOCYSTIS SP.	29	4.03		
CHROMOCOCUS TURGIUS	1	0.69	NAVICULA SP.	6	0.83		
SPEC-5-1	40	1038	SYNTHETICUM SP.	10	1.39		
APANDITHCE SP.	6	0.57	NITZSCHIA ACICULARIS	2	0.27		
CYCLOTFILA SP.	204	19.65	SYNTHETICUM SP.	2	0.27		
TARCELLARIA FENESTRATA	154	14.83	GLOFCYSTIS SP.	67	9.33		
PEDIASTRUM SP.	39	3.75	FRAGILARIA CROTONEENSIS	12	1.67		
ANAFENA CIRCINALIS	30	2.89	FRAGILARIA INFRMEDIA	6	0.83		
DINOBRYON DIVERGENS	18	1.73	FRAGILARIA CAPUCINA	31	4.31		
MICROSTIS SP.	56	5.39	FRANCIA SP.	11	1.53		
CHLADOMONAS SP.	24	2.31	SCYNTHESMUS SP.	8	1.11		
CRYPTOMONAS SP.	13	1.25	CLOSTEPIUM SP.	2	0.27		
SYNTHETICUM SP.	4	0.38	GREEN CYLINDRUM UNKNOWN	1	0.13		
WEISSIA GRANULATA	156	15.02	COSMARIA SP.	2	0.27		
WEISSIA GRANULATA V. ANGUSTISSIMA	17	1.63	TETRAEDRON MINIMUM	4	0.55		
DINOBRYON QUADRICAUDA	2	0.19	MOGUFETIA SP.	1	0.13		
SCYNTHESMUS OPPILIENSIS	13	1.25	ANKISTRONFUSUS FALCATUS	2	0.27		
SCYNTHESMUS SP.	2	0.19	CYANOPLEURA SOLFA	1	0.13		
CONFLASTRUM SP.	2	0.19	DICTYCOSP. HAFTIUM PULCHELLUM	5	0.69		
MINGENTIA SP.	6	0.57	FLAGELLATES	6	0.83		
SYNTHETA ULNA	7	0.67	KHANOTHECE SP.	158	24.00		
NAVICULA SP.	7	0.67	FRANCIA OVALIS	2	0.27		
NITZSCHIA SP.	13	1.25	KIRCHNERIFLIA SP.	1	0.13		
AMPENDA OVALIS V. PEDICULUS	4	0.38	AMPHORA SP.	2	0.27		
ACVANTHFS SP.	2	0.19	SYNTHETA ULNA V. DANICA	1	0.13		
DICSYNTHFS SP.	18	1.73	SP. SP.	6	0.83		
ANKISTRONFUSUS FALCATUS	4	0.38	FRAGILARIA CROTONEENSIS	2	0.27		
CYANOPLEURA SOLEA	2	0.19	FAGILARIA CROTONEENSIS	28	10.07		
TETRAEDRON MINIMUM	4	0.38	FRAGILARIA CROTONEENSIS	2	0.71		
GLENINIA PADIATA	2	0.19	CRYPTOMONAS SP.	4	1.43		
COSMARIA SP.	4	0.38	DEFICONTIUM SP.	1	0.35		
FRAGILARIA CONSTUENS	22	2.11	CYCLOTFILA SP.	31	11.15		
FRAGILARIA INFRMEDIA	98	9.44	ANTISTONFUSUS FALCATUS	50	36.33		
FRAGILARIA CONSTUENS	67	6.45	STEPHANOIDSIS SP.	2	0.71		
FRAGILARIA CAPUCINA	11	1.05	FRAGILARIA CAPUCINA	11	3.95		
FLAGELLATES	11	1.05	SYNTHETA ULNA	1	0.35		
STRASSTRUM SPINULOSA	2	0.19	COSMARIA SP.	1	0.35		
FRAGILARIA LEPTOSTARIDIUM	4	0.38	AMPENDA OVALIS	18	6.47		
SYNTHETA ULNA V. DANICA	2	0.19	CALONIFSIS SP.	1	0.35		
STRASSTRUM SPINULOSA	2	0.19	COSMARIA SP.	1	0.35		
AMPENDA OVALIS	2	0.19	TETRAEDRON MINIMUM	2	0.71		

## Appendix B continued

Appendix B continued

SDC-2-0	34	962	3.55	SDC-2-1	29	1012	3.58.
<i>AMISTRODESMUS FALCATUS</i>	6	0.62	0.62	<i>SYNEDRA ULNA V. DANICA</i>	2	0.19	
<i>CRYPTCHONAS SP.</i>	11	1.14	1.14	<i>SCENEDESMUS QUADRICAUDA V. MAXIMUS</i>	7	0.69	
<i>CHLAMYDOMONAS SP.</i>	19	1.97	1.97	<i>AMISTRODESMUS FALCATUS</i>	4	0.39	
<i>TABELLARIA FENESTRATA</i>	191	19.85	26.19	<i>MICROCYSTIS AERUGINOSA</i>	178	17.58	
<i>CYCLOTELLA SP.</i>	252	26.19		<i>CRYPTCHONAS SP.</i>	1.9	1.87	
<i>ANABAENA CIRCINALIS</i>	1.17	1.76		<i>TABELLARIA FENESTRATA</i>	191	16.87	
<i>PERIDINUM SP.</i>	43	4.46		<i>CYCLOTELLA SP.</i>	202	19.96	
<i>DINOBRYON DIVERGENS</i>	41	4.26		<i>ANABAENA CIRCINALIS</i>	24	2.37	
<i>NITZSCHIA SP.</i>	13	1.35		<i>PERIDINUM SP.</i>	35	3.45	
<i>NAVICULA SP.</i>	9	0.93		<i>DINOBRYON DIVERGENS</i>	48	4.74	
<i>FRAGILARIA CROTONENSIS</i>	96	9.97		<i>FRAGILARIA CROTONENSIS</i>	106	10.47	
<i>SYNEDRA ULNA</i>	11	1.14		<i>COSMARIA SP.</i>	6	0.59	
<i>SPORES</i>	13	1.35		<i>MCUCETIA SP.</i>	9	0.88	
<i>GLOEOPHYTIS SP.</i>	6	0.62		<i>FRAGILARIA INTERMEDIA</i>	13	1.26	
<i>MELOSIRA GRANULATA</i>	37	3.84		<i>FRAGILARIA CAPUCINA</i>	13	1.26	
<i>MELOSIRA GRANULATA V. AUGUSTISSIMA</i>	111	11.53		<i>MELOSIRA GRANULATA</i>	7	0.69	
<i>SYNEDRA ACUS</i>	2	0.20		<i>MELOSIRA GRANULATA V. AUGUSTISSIMA</i>	19	1.67	
<i>SCENEDESMUS SP.</i>	13	1.35		<i>MELOSIRA ITALICA</i>	13	1.26	
<i>TETRAEDRUM MINIMUM</i>	2	0.20		<i>NEPHROCYTUM SP.</i>	11	1.08	
<i>MCUCETIA SP.</i>	4	0.41		<i>NITZSCHIA SP.</i>	24	2.37	
<i>FRAGILARIA INTERMEDIA</i>	22	2.28		<i>TETRAEDRON MINIMUM</i>	9	0.88	
<i>INCYSTIS SP.</i>	6	0.62		<i>AMPHORA SP.</i>	4	0.19	
<i>GLENKINIA RADIIATA</i>	4	0.41		<i>AMPHORA OVALIS</i>	2	0.19	
<i>DINOFAGELLATE CYSTS</i>	2	0.20		<i>SCENEDESMUS OPOLIENSIS</i>	4	0.39	
<i>NAVICULA GASTRUM</i>	2	0.20		<i>SCENEDESMUS SP.</i>	7	0.69	
<i>DICTYOSPHERIUM PULCHELLUM</i>	2	0.20		<i>OCYSTIS SP.</i>	45	4.44	
<i>PEDIASTRUM SP.</i>	2	0.20		<i>SCHROEDERIA JUDAYI</i>	2	0.19	
<i>SURIFELLA SP.</i>	2	0.20		<i>FRAGILARIA PINNATA</i>	6	0.59	
<i>CALONEIS SP.</i>	4	0.41		<i>FRANCEA OVALIS</i>	2	0.19	
<i>DIPLOCLEIS SP.</i>	2	0.20					
<i>AMPHORA SP.</i>	2	0.20					
<i>CYMBELLA SP.</i>	2	0.20					
<i>FRANCEA DROESCHERI</i>	2	0.20					
<i>FLAGELLATES</i>	2	0.20					
	11	1.14					
SDC-2-3	13	265	2.55		16	337	3.23
<i>TABELLARIA FENESTRATA</i>	114	43.01		<i>TABELLARIA FENESTRATA</i>	108	32.04	
<i>OCYSTIS SP.</i>	11	4.15		<i>CRYPTCHONAS SP.</i>	5	1.48	
<i>PERIDINUM SP.</i>	94	20.37		<i>OCYSTIS SP.</i>	18	5.34	
<i>AMISTRODESMUS FALCATUS</i>	12	4.52		<i>ANABAENA CIRCINALIS</i>	37	10.97	
<i>CRYPTCHONAS SP.</i>	6	2.26		<i>DINOBRYON DIVERGENS</i>	10	2.96	
<i>DINOBRYON DIVERGENS</i>	21	7.92		<i>CYCLOTELLA SP.</i>	7	2.17	
<i>CYCLOTELLA SP.</i>	2	0.75		<i>CHLAMYDOMONAS SP.</i>	16	4.74	
<i>FRAGILARIA CROTONENSIS</i>	27	10.18		<i>PERIDINUM SP.</i>	22	6.52	
<i>ANABAENA SP.</i>	12	4.52		<i>DINOFAGELLATE CYSTS</i>	1	0.29	
<i>COSMARIA SP.</i>	2	0.75		<i>TETRAEDRON MINIMUM</i>	2	0.59	
<i>MCUCETIA SP.</i>	2	0.75		<i>ASTERIONELLA FIRMOSA</i>	4	1.18	
<i>TETRAEDRUM MINIMUM</i>	1	0.37		<i>AMISTRODESMUS FALCATUS</i>	8	2.37	
<i>CLOSTERIUM SP.</i>	1	0.37		<i>FRAGILARIA CAPUCINA</i>	43	12.75	
	1	0.37		<i>CLOSTERIUM SP.</i>	3	0.89	
				<i>FRAGILARIA INTERMEDIA</i>	12	3.56	
				<i>FRAGILARIA CROTONENSIS</i>	38	11.27	
				<i>OSCILLATORIA SP.</i>	1	0.29	
				<i>SCENEDESMUS QUADRICAUDA</i>	2	0.59	

## Appendix B continued

SDC-2-4		316	2.29	SDC-4-0	4.0
DINOBRYON DIVERGENS	63	19.93		CALONEIS VENTRICOSA V. TRUNCATA	4.22
OOCYSTIS SP.	7	2.21		COELASTRUM SP.	0.18
TABELLARIA FENESTRATA	63	26.26		GLOEOCYSTIS SP.	0.36
ANABAENA CIRCINALIS	5	1.58		COSMARIA SP.	0.36
PERIDINIUM SP.	15	4.74		CLOSTERIUM SP.	0.18
FRAGILARIA CROTONEA	122	36.60		NITZSCHIA ACICULARIS	0.90
ASTERIONELLA FORMOSA	3	0.94		CYMATPLEURA SOLEA	0.36
COSMARIA SP.	1	0.31		NITZSCHIA SP.	2.17
SCENEDESMEUS SP.	1	0.31		NAVICULA GASTRUM	2.71
FRAGILARIA CAPUCINA	14	4.43		FRAGILARIA CROTONENSIS	0.18
FRANCEIA DROESCHERI	1	0.31		FRAGILARIA INTERMEDIA	7.60
CYCLOTELLA SP.	1	0.31		FRAGILARIA CAPUCINA	3.07
PERIDINIUM SP.				ASTERIONELLA FORMOSA	5.61
CYCLOTELLA SP.				PERIDINIUM SP.	0.36
STEPHANODISCUS SP.				CYCLOTELLA SP.	9.42
TABELLARIA FENESTRATA				STEPHANODISCUS SP.	10.05
ANABAENA CIRCINALIS				TABELLARIA FENESTRATA	10.05
OOCYSTIS SOLITARIA				ANABAENA CIRCINALIS	13.40
OOCYSTIS SUBMARINA				OOCYSTIS SOLITARIA	5.07
FRANCEIA DROESCHERI				OOCYSTIS SUBMARINA	4.52
FRAGILARIA CROTONEA				FRANCEIA DROESCHERI	1.26
TETRAEDRON MINIMUM				ANKISTODESMUS FALCATUS	1.08
ANABAENA CIRCINALIS				DINOBRYON DIVERGENS	1.44
MUGGECTIA SP.				MELOSIRA SP.	6.34
MELOSIRA SP.				CRYPTOMONAS SP.	5.79
ACANTHOTHES HAUCKIANA				MELOSIRA SP.	1.44
SYNECRA ULNA V. CHAESANA				CRYPTOMONAS SP.	0.54
NAVICULA SP.				AMPHORA SP.	6
TRIBONEMA SP.				KIRCHNERIELLA SP.	2
SCENEDESMEUS SP.				TETRAEDRON MINIMUM	4
FLAGELLATES				SCENEDESMEUS DIMORPHUS	0.36
GLENKINIA RADIATA				SCENEDESMEUS SP.	4
MELOSIRA GRANULATA V. ANGUSTISSIMA				DICTYOSPHERIUM PULCHELLUM	1.63
AMPHORA SP.				MALLomonas SP.	2
CYPTOMONAS SP.				CHRyDODCOCCUS SP.	0.18
AMPHORA OVALIS				AMPHORA OVALIS	2
GLENKINIA RADIATA				GLENKINIA RADIATA	0.18
NEPHRCYTIUM SP.				NEPHRCYTIUM SP.	0.36
SYNECRA ULNA V. CHAESANA				SYNECRA ULNA V. CHAESANA	0.18
NAVICULA CAPITATA				NAVICULA CAPITATA	2
SCENEDESMEUS QUADRICAUCA				SCENEDESMEUS QUADRICAUCA	6
COSMARIA SP.					0.54
NITZSCHIA SP.					
SURIRELLA SP.					
CYMBELLA SP.					
200 SPORES					
					4

Appendix B continued

SDC -4-2	26	798	3.08	SDC -4-4	17	331	3.15
<i>FRANCIA DROESCHERI</i>			2	0.25	<i>FRAGILARIA CAPUCINA</i>	34	10.27
<i>ANABAENA CIRCINALIS</i>			60	7.51	<i>FRAGILARIA CROTONENSIS</i>	64	19.33
<i>PERICINIUM SP.</i>			54	6.76	<i>DINOBRYON DIVERGENS</i>	49	14.60
<i>TABELLARIA FENESTRATA</i>			161	22.68	<i>OOCYSTIS SUBARINA</i>	6	1.81
<i>DOCYCTIS SOLITARIA</i>			22	2.75	<i>TABELLARIA FENESTRATA</i>	87	26.28
<i>DINOBRYON DIVERGENS</i>			33	4.13	<i>ANABAENA CIRCINALIS</i>	10	3.12
<i>CHLAMYDOMONAS SP.</i>			13	1.62	<i>PERIDINIUM SP.</i>	12	3.62
<i>CYCLOTELLA SP.</i>			15	1.87	<i>CHLAMYDOMONAS SP.</i>	16	4.83
<i>FRAGILARIA CROTONENSIS</i>			119	14.91	<i>CRYPTOMONAS SP.</i>	9	2.71
<i>TETRAEDRON MINIMUM</i>			2	0.25	<i>CYCLOTELLA SP.</i>	2	0.60
<i>ANKISTRODESmus FALCATUS</i>			2	0.25	<i>LAGERHEIMIA LONGISETA</i>	1	0.30
<i>SCENEDESMUS QUADRICAUDA</i>			3	0.37	<i>TETRAEDRON MINIMUM</i>	4	1.20
<i>COSMARium SP.</i>			1	0.12	<i>DINFLAGELLATE CYSTS</i>	2	0.60
<i>MUGECTIA SP.</i>			3	0.37	<i>ASTERIGNELLA FORMOSA</i>	23	6.94
<i>ASTERIGNELLA FORMOSA</i>			3	0.37	<i>SCENEDESMUS QUADRICAUDA</i>	1	0.30
<i>DINOFLAGELLATE CYSTS</i>			2	0.25	<i>MUGECTIA SP.</i>	1	0.30
<i>GREEN COLONY UNKNOWN</i>			222	27.81	<i>CLOSTERIUM SP.</i>	10	3.02
<i>CRYPTOMONAS SP.</i>			7	0.87			
<i>MELOSIRA ISLANDICA</i>			6	0.75			
<i>SYNEDRA DELICATISSIMA v. ANGUSTISSIMA</i>			1	0.12			
<i>FRAGILARIA CAPUCINA</i>			42	5.26			
<i>DIPLONEIS SP.</i>			1	0.12	<i>CHLAMYDOMONAS SP.</i>	23	3.63
<i>STAUASTRUM SP.</i>			1	0.12	<i>TABELLARIA FENESTRATA</i>	169	26.74
<i>GLUEDCYSTIS SP.</i>			1	0.12	<i>ANABAENA CIRCINALIS</i>	79	12.51
<i>NITZSCHIA SP.</i>			1	0.12	<i>PERIDINIUM SP.</i>	50	7.91
<i>NAVICELLA SP.</i>			1	0.12	<i>GLENODINIUM SP.</i>	6	0.94
					<i>CYCLOTELLA SP.</i>	56	7.91
					<i>DINOBRYON DIVERGENS</i>	66	10.44
					<i>CRYPTOMONAS SP.</i>	7	1.10
					<i>ZOSPERFS</i>	21	3.32
					<i>NAVICELLA SP.</i>	13	2.05
					<i>SYNEDRA ULNA</i>	1	0.15
					<i>NITZSCHIA SP.</i>	12	1.89
					<i>SYNEDRA OSTENFELDII</i>	3	0.67
					<i>FRAGILARIA CROTONENSIS</i>	52	8.22
					<i>GLOEODYSTIS SP.</i>	3	0.47
					<i>CLUSTERIUM SP.</i>	1	0.15
					<i>DICTYOSPHAERIUM PULCHELLUM</i>	1	0.15
					<i>OOCYSTIS SOLITARIA</i>	11	1.74
					<i>SCENEDESMUS QUERICAUCA</i>	2	0.31
					<i>MUGECTIA SP.</i>	4	0.63
					<i>ANKISTRODESMUS FALCATUS</i>	10	1.58
					<i>SCENEDESMUS ARMATUS</i>	2	0.31
					<i>MELOSIRA ISLANDICA</i>	7	1.10
					<i>TERABEDRON MINIMUM</i>	8	1.26
					<i>MALLOMONAS SP.</i>	12	1.89
					<i>MICROSPORA SP.</i>	1	0.15
					<i>AMPHORA OVALIS</i>	1	0.15
					<i>FRANCIA DROESCHERI</i>	2	0.31
					<i>SCENEDESMUS BIJUGA</i>	1	0.15
					<i>SCENEDESMUS OPOLIENSIS</i>	1	0.15
					<i>MELOSIRA ITALICA</i>	10	1.58
					<i>FRAGILARIA CAPUCINA</i>	3	0.47

## Appendix B continued

SDC-7-2	42	13274	0.49	0.00	SDC-7-3	37	637	3.54
<i>FRANCIA DROESCHERI</i>	1	1	1	0.00	<i>TABELLARIA FENESTRATA</i>	209	33.17	
<i>SCENODESMUS QUADRICAUDA V. MAXIMUS</i>	2	12583	94.79.	0.01	<i>CHLAMYDOMONAS SP.</i>	58	9.21	
<i>CLOSTERIUM SP.</i>	17		0.12	0.05	<i>CRYPTOMONAS SP.</i>	25	3.96	
<i>GREEN CELLS LITTLE</i>	7		1.57.	0.05	<i>PERIDINIUM SP.</i>	22	3.49	
<i>UCYSTIS SOLITARIA</i>	91		0.68.	0.68.	<i>Q. ENDONIUM SP.</i>	16	2.53	
<i>OCYCSTIS BORGII</i>	75		0.56	0.25	<i>STAURONEIS SP.</i>	1	0.15	
<i>TABELLARIA FENESTRATA</i>	209		0.04	0.04	<i>DINOBRYON DIVERGENS</i>	13	2.06	
<i>ANABAENA CIRCINALIS</i>	34		0.04	0.04	<i>AMPHORA OVALIS</i>	86	13.65	
<i>DINOPHYUM DIVERGENS</i>	6		0.04	0.04	<i>CHLORELLA SP.</i>	29	4.61	
<i>PERIDINIUM SP.</i>	10		0.07	0.07	<i>SCENODESMUS QUADRICAUDA</i>	4	0.63	
<i>GLENDONIUM SP.</i>	15		0.11	0.11	<i>ASTERIONELLA FORMOSA</i>	4	0.63	
<i>CHLURELLA SP.</i>	34		0.25	0.25	<i>FRAGILARIA CROTONENSIS</i>	64	10.15	
<i>CYCLOTILLA SP.</i>	13		0.09	0.09	<i>MELOSIRA ISLANDICA</i>	8	1.26	
<i>STEPHANOIDSICUS SP.</i>	3		0.02	0.02	<i>OOCYSTIS BORGII</i>	9	1.47	
<i>MCUGETTIA SP.</i>	6		0.04	0.04	<i>CYCLOTELLA SP.</i>	19	3.71	
<i>ASTERIONELLA FORMOSA</i>	3		0.02	0.02	<i>STEPHANOIDSICUS SP.</i>	5	0.79	
<i>MALLOMONAS SP.</i>	13		0.09	0.09	<i>MALLOCHMNAS SP.</i>	3	0.47	
<i>FRAGILARIA CAPUCINA</i>	54		0.40	0.40	<i>NAVICULA SP.</i>	2	0.31	
<i>FRAGILARIA CROTONENSIS</i>	6		0.04	0.04	<i>NITZSCHIA SP.</i>	8	1.26	
<i>CRYPTOMONAS SP.</i>	28		0.21	0.21	<i>TETRAEDRON MINIMUM</i>	3	0.47	
<i>MELOSIRA ISLANDICA</i>	11		0.08	0.08	<i>ANKistrodesmus Falcatus</i>	6	0.95	
<i>MELOSIRA ITALICA</i>	2		0.01	0.01	<i>OOCYSTIS SOLITARTIA</i>	4	0.63	
<i>AMPHORA OVALIS</i>	9		0.06	0.06	<i>MCUGETTA SP.</i>	3	0.47	
<i>NAVICULA SP.</i>	3		0.02	0.02	<i>AMPHIPLERA PELLUCIDA</i>	1	0.15	
<i>SYNECRA FILIFORMIS</i>	5		0.03	0.03	<i>CCSMARIUM SP.</i>	4	0.63	
<i>ANKistrodesmus Falcatus</i>	6		0.04	0.04	<i>COELASTRUM Sphaericum</i>	1	0.15	
<i>TETRAEDRON MINIMUM</i>	1		0.00	0.00	<i>GLOECYSTIS SP.</i>	1	0.15	
<i>SCENODESMUS ARMATUS</i>	1		0.00	0.00	<i>FRAGILARIA CAPUCINA</i>	7	1.11	
<i>CACTYLOCOCOPSIS SP.</i>	1		0.01	0.01	<i>FRANCIA OVALIS</i>	1	0.15	
<i>PHORMIDIUM SP.</i>	2		0.03	0.03	<i>SCENODESMUS OPOLIENSIS</i>	1	0.15	
<i>DIPLONEIS SP.</i>	4		0.01	0.01	<i>CYMATOPLURA SOLFA</i>	1	0.15	
<i>Synehra ulna v. chaeana</i>	2		0.01	0.01	<i>CERATIUM MIRUNDINELLA</i>	1	0.15	
<i>TRIBOKEMA SP.</i>	1		0.00	0.00	<i>SYNEDRA ULNA</i>	1	0.15	
<i>SCENODESMUS DIMORPHUS</i>	1		0.00	0.00	<i>SYMEDRA FILIFORMIS</i>	1	0.15	
<i>FRAGILARIA INTERMEDIA</i>	1		0.03	0.03	<i>FRAGILARIA INTERMEDIA</i>	6	0.95	
<i>FRANCIA OVALIS</i>	1		0.01	0.01	<i>SPORES RESTING</i>	2	0.31	
<i>NEIDIUM DUBIUM</i>	1		0.00	0.00	<i>DINOFLAGELLATE CYSTS</i>	1	0.15	
<i>PEDIASTRUM DUPLEX</i>	2		0.01	0.01				
<i>ACHMANTHES SP.</i>	2		0.01	0.01				
<i>DICTYOSPHAERIUM PULCHELLUM</i>	2		0.01	0.01				

## Appendix B continued

SDC-7-4	26	712	3-20	DC-1	23	390	3-18
CHLAMYDOMONAS SP.	160	22.47	TABELLLARIA FENESTRATA		126	32.30	
CRYPTOMONAS SP.	40	5.61	PERIDINIUM SP.		65	16.66	
CHLORELLA SP.	79	11.09	ANABAENA CIRCINALIS		38	9.74	
ANABAENA CIRCINALIS	105	14.74	CYCLOTELLA SP.		20	5.12	
TABELLLARIA FENESTRATA	179	25.14	CHLAMYDOMONAS SP.		38	9.74	
GLENODINIUM SP.	10	1.40	CRYPTOMONAS SP.		5	1.28	
PERIDINIUM SP.	29	4.07	MOUCHEOTIA SP.		7	1.79	
CYCLCTELLA SP.	10	1.40	COSMARIA SP.		3	0.76	
STEPHANODISCUS SP.	10	1.40	ANKISTODESMUS FALCATUS		4	1.02	
CLOSTERIUM SP.	2	0.28	TERAEDRON MINIMUM		3	0.76	
MELUSIRA ISLANDICA	8	1.12	FRAGILARIA CROTONENSIS		27	6.92	
FRAGILARIA CAPUCINA	33	4.63	COCCYSTIS SP.		28	7.17	
MALLOMONAS SP.	4	0.56	MELOSTRA SP.		4	1.02	
GLOEOPHYT'S SP.	1	0.14	FRAGILARIA CAPUCINA		10	2.56	
TETRAEDRON MINIMUM	6	0.84	NAVICULA SP.		2	0.51	
ANKISTODESMUS FALCATUS	6	0.84	SCENEDESIUS SP.		1	0.25	
COSMARIA SP.	12	1.68	DICTYOSPHAERIUM PULCHELLUM		1	0.25	
DOCYSTIS SOLITARIA	15	0.70	PHORMIDIUM SP.		1	0.25	
DOCYSTIS BURGEI	3	0.42	GLENKINTIA RADIATA		3	0.76	
DINFLAGELLATE CYSTS	1	0.14	FRANCEIA DROESCHERI		1	0.25	
NITZSCHIA SP.	1	0.14	MALLOMONAS SP.		1	0.25	
DIATOMA VULGARE	1	0.14	NITZSCHIA SP.		1	0.25	
GREEN CELLS	2	0.28	AMPHORA SP.		1	0.25	
QUADRIGULA LACUSTRIS	1	0.14					
COELASTRUM Sphaericum	1	0.14					
ASTERICHELLA FORMOSA	2	0.28					
DC-2							
23	413	2.08	TETRAEDRON LUNULA		2	0.49	
PERIDINIUM SP.	23	5.56	TETRAEDRON MINIMUM		16	2.45	
GLENODINIUM SP.	3	0.72	ANABAENA CIRCINALIS		30	9.58	
CRYPTOMONAS SP.	10	2.42	TABELLLARIA FENESTRATA		104	25.55	
CYCLCTELLA SP.	18	4.35	PERIDINIUM SP.		49	12.03	
CHLAMYDOMONAS SP.	1	0.24	DOCYSTIS SOLITARIA		18	4.42	
GLOEOPHYT'S SP.	1	0.24	DINOBRYON DIVERGENS		38	9.33	
DOCYSTIS SOLITARIA	18	4.35	FRAGILARIA CROTONENSIS		21	5.15	
ANABAENA CIRCINALIS	14	3.38	CRYPTOMONAS SP.		5	1.22	
DINOBRYON DIVERGENS	43	10.41	CHLAMYDOMONAS SP.		22	5.41	
CLOSTERIUM SP.	1	0.24	OPEN CELLS		43	10.56	
AMPHORA OVALIS	1	0.24	FRANCEIA DROESCHERI		6	1.08	
CYMATOPLEURA SOLEA	1	0.24	CYCLOTELLA SP.		7	1.71	
SCENESCIUS OPPILIENSIS	1	0.24	ANKISTODESMUS FALCATUS		7	1.71	
ANKISTODESMUS FALCATUS	2	0.48	MELOSTRA ISLANDICA		5	1.22	
MALLOMONAS SP.	6	1.45	DOCYSTIS SUBMARINA		5	1.22	
SYNTHRA SP.	3	0.72	COSMARIA SP.		4	1.08	
DINFLAGELLATE CYSTS	5	1.21	MOUCHEOTIA SP.		6	1.47	
FRAGILARIA CAPUCINA	18	4.35	ZOOSPORES		3	0.73	
CHLORFILLA SP.	44	10.65	SCENESESIUS ABUNCANS		6	1.47	
TABELLLARIA FENESTRATA	192	46.48	TRIBONEMA SP.		1	0.24	
SYNTHRA ULVA	1	0.24	ASTERIOPHILA FORMOSA		4	0.98	
MELUSIRA ISLANDICA	4	0.96	GLOEOPHYT'S SP.		3	0.73	
SCENESESIUS QUADRICAUCA	3						

## Appendix B continued

DC-3	30	647	3.60	DC-5		12	286	2.89
				1	0.15			
<i>GOLDENKINIA RADIATA</i>				1	0.15			
<i>SCENEDESMEUS OPOLENTIS</i>				1	0.15			
<i>FRAGILARIA CROTONENSIS</i>				69	10.66			
<i>TABELLARIA FENESTRATA</i>				1a6	28.74			
<i>DINOBRYON DIVERGENS</i>				34	5.25			
<i>PERIDINIUM SP.</i>				61	9.42			
<i>CHLAMYDOMONAS SP.</i>				38	5.87			
<i>CRYPTOCYSTIS SP.</i>				11	1.70			
<i>ANABAENA CIRCINALIS</i>				64	9.89			
<i>OOCYSTIS SOLITARIA</i>				22	3.40			
<i>OOCYSTIS SP.</i>				3	0.46			
<i>GLOFOCYSTIS SP.</i>				2	0.30			
<i>ANKISTODESMUS FALCATUS</i>				6	0.92			
<i>MALLOMONAS SP.</i>				6	0.92			
<i>CYCLOTELLA SP.</i>				8	1.23			
<i>YOSPOCHES</i>				3	0.46			
<i>TETRAEDRON MINIMUM</i>				17	2.62			
<i>COSMARIA SP.</i>				4	0.61			
<i>CRUCIGENIA QUADRATA</i>				1	0.15			
<i>ASTERINELLA FORQUESA</i>				7	1.08			
<i>GREEN CELLS TINY</i>				32	4.94			
<i>GREEN CELLS</i>				38	5.87			
<i>TRIPORNA SP.</i>				1	0.15			
<i>CYMBELLA SP.</i>				1	0.15			
<i>FRAGILARIA INTERMEDIA</i>				21	3.24			
<i>SYNODA ULJA</i>				1	0.15			
<i>QUADRIGULA LACUSTRIS</i>				1	0.15			
<i>MUGEDUTIA SP.</i>				1	0.92			
<i>NITZSCHIA SP.</i>				1	0.15			
<i>SCENEDESMEUS QUADRANGULUS</i>				1	0.15			
 DC-4	 15	 448	 1.85					
<i>GREEN CELLS</i>				281	62.72			
<i>ANKISTODESMUS FALCATUS</i>				9	2.00			
<i>TABELLARIA FENESTRATA</i>				94	20.98			
<i>CRYPTOMONAS SP.</i>				2	0.44			
<i>DINOBRYON DIVERGENS</i>				7	1.56			
<i>CYCLOTELLA SP.</i>				4	0.89			
<i>PERIDINIUM SP.</i>				6	1.33			
<i>OOCYSTIS SP.</i>				5	1.11			
<i>ANABAENA CIRCINALIS</i>				10	2.23			
<i>NITZSCHIA SP.</i>				3	0.66			
<i>FRAGILARIA CROTONENSIS</i>				19	4.24			
<i>SCENEDESMEUS SP.</i>				3	0.66			
<i>TETRAEDRON MINIMUM</i>				2	0.44			
<i>NAVICELLA SP.</i>				1	0.22			
<i>FRAGILARIA INTERMEDIA</i>				2	0.44			
 DC-5	 11	 333	 2.39					
<i>QUADRIGULA LACUSTRIS</i>					2			
<i>ANABAENA SP.</i>					4			
<i>CLOSTERIUM SP.</i>					1			
<i>DINOBRYON DIVERGENS</i>					99			
<i>PERIDINIUM SP.</i>					28			
<i>TABELLARIA FENESTRATA</i>					88			
<i>OOCYSTIS SP.</i>					32			
<i>TETRAEDRON MINIMUM</i>					32			
<i>FRAGILARIA CROTONENSIS</i>					3			
<i>LAGERHEIMIA LONGISETA</i>					112			
<i>SCENEDESMEUS SP.</i>					2			
 DC-6	 26	 458	 3.39					
<i>TABELLARIA FENESTRATA</i>					153			
<i>ANABAENA CIRCINALIS</i>					36			
<i>DINOBRYON DIVERGENS</i>					32			
<i>PERIDINIUM SP.</i>					49			
<i>OOCYSTIS SUBMARINA</i>					6			
<i>OOCYSTIS SUBMARINA</i>					19			
<i>ZOO SPORSES</i>					44			
<i>MALLUCYNAS SP.</i>					6			
<i>CRYPTOMONAS SP.</i>					7			
<i>CYCLOTELLA SP.</i>					12			
<i>CCSMARIUM SP.</i>					4			
<i>TETRAEDRON MINIMUM</i>					5			
<i>NAVICELLA SP.</i>					2			
<i>FRAGILARIA CROTONENSIS</i>					37			
<i>DINOPLAGELATE CYSTS</i>					1			
<i>FRANCIA DRIESCHERI</i>					3			
<i>CHLAMYDOMONAS SP.</i>					21			
<i>ANKISTODESMUS FALCATUS</i>					3			
<i>ANKISTODESMUS BRAUNII</i>					3			
<i>FRAGILARIA CAPUCINA</i>					9			
<i>NITZSCHIA SP.</i>					2			
<i>FLAGELLATES</i>					2			
<i>SYNCILLA ULNA</i>					1			
<i>FRAGILARIA INTERMEDIA</i>					1			
<i>BLUE-GREEN UNKNOWN COLONIES</i>					1			
<i>MICROCTENIA SP.</i>					1			

NDC--5-1	3.92	1794	42	504	3.88
FRAGILARIA INTERMEDIA	15	0.83		58	11.50
ANABAENA CIPICINALIS	52	2.89		21	4.16
MUGECTIA SP.	4	0.22		146	28.96
TREUBARIA SETIGERUM	4	0.22		24	6.76
LAGERHEIMIA SP.	4	0.22		15	2.97
FRANCEA DROESCHERI	4	0.22		4	0.79
CYCLOTELLA SP.	230	12.82		39	7.73
ZOOSPORES	390	21.73		36	7.14
OCYCTIS SOLITARIA	82	4.57		38	7.53
OCYCTIS SP.	15	0.83		19	3.76
OCYCTIS SUBMARINA	48	2.67		8	1.58
SCENEDESMEUS QUADRICAUDA	7	0.39		6	1.19
SCENEDESMEUS INCRASSATUS	4	0.22		8	1.58
SCENEDESMEUS OPOLIENSIS	7	0.39		1	0.19
SCENEDESMEUS SP.	15	0.83		1	0.19
PERIDINUM SP.	96	5.35		3	0.59
ULECTOSPHERIUM PULCHELLUM	59	3.28		4	0.79
CRYPTOMONAS SP.	4	0.22		2	0.39
DINOBRYON LAGELLATE CYSTS	4	0.22		2	0.39
FRAGILARIA CROTONENSIS	100	5.57		4	0.79
DINOBRYON DIVERGENS	59	3.28		1	0.19
TABELLARIA FENESTRATA	170	9.47		2	0.39
QUADRIGJLA LACUSTRIS	4	0.22		18	3.57
GREEN COLONY UNKNOWN	7	0.39		1	0.39
TETRAEDRON MINIMUM	4	0.22		5	0.99
MELIUSIRA SP.	252	14.04		2	0.39
ACHNANTHES SP.	4	0.22		1	0.19
NAVICULA SP.	22	1.22		3	0.59
AMPHORA SP.	18	1.00		1	0.19
SPIRELLA SP.	4	0.22		2	0.39
NEIDIUM DIUTIUM	4	0.22		8	1.58
CRUCIGENIA QUADRATA	11	0.61		1	0.19
KIKICHNERIELLA SP.	4	0.22		1	0.19
SUPIRELLA SP.	4	0.22		1	0.19
SYNEDRA SP.	11	0.61		1	0.19
GLENKINIA RACIATA	11	0.61		1	0.19
NITSCHIA SP.	7	0.39		1	0.19
ANKISTODESMUS FALCATUS	18	1.00		1	0.19
SCENEDESMUS DIMORPHUS	7	0.39		4	0.79
CLOSTERIUM SP.	7	0.39		1	0.19
PALLCMONAS SP.	11	0.61		1	0.19
CHLAMYDOMONAS SP..	11	0.61		1	0.19
FRAGILARIA CONSTRUENS				6	1.19

Appendix B continued

## Appendix B continued

NDC-1-1	31	1244	3.68	
CRYPTOMMAS SP.		28	2.25	
UNKNOWN CELLS	4	0.32		
TAELLARIA FENESTRATA	140	11.25		
PERIDINUM SP.	64	5.14		
CYCLIETELLA SP.	324	26.04		
ANAFERA CIRCINALIS	28	2.25		
INCYSTIS SP.	32	2.57		
DINOBRYON DIVERGENS	68	5.46		
CCSPARIUM SP.	8	0.64		
FUND CELLS BROKEN COLONIES	28	2.25		
MELOSIRA GRANULATA V. ANGSTISSIMA	60	4.82		
TETRAERON MINIMUM	20	1.60		
SCENEDESMEUS OPOLIENSIS	4	0.32		
SCENEDESMEUS INCRASSATUS	6	0.46		
SCENEDESMEUS SP.	24	1.92		
NITZSCHIA SP.	28	2.25		
FRAGILARIA CROTONENSIS	108	8.68		
GLUCOCYSTIS SP.	8	0.64		
NAVICULA SP.	12	0.96		
MELISTRA GRANULATA	92	7.39		
CHLAMYDOMONAS SP.	12	0.96		
SPIRES	44	3.53		
DINIFLAGELLATE CYSTS	4	0.32		
STEPHANODISCUS SP.	4	0.32		
PEDIASTRUM DUPLEX	4	0.32		
GREEN COLONY UNKNOWN	4	0.32		
CLOSTERIUM SP.	4	0.32		
GOMPHONEMA SP.	4	0.32		
FRAGILARIA CAPUCINA	64	5.14		
SCENEDESMEUS ABUNDANS	4	0.32		
SCENEDESMEUS QUADRANGUADA	8	0.64		
				NDC-1-2
	27	974	1.65	
TABELLARIA FENESTRATA	141	14.47		
BLUET-GREEN UNKNOWN COLONIES	689	70.73		
DINOBRYON DIVERGENS	16	1.02		
PERIDINUM SP.	44	4.51		
ANAFERA CIRCINALIS	17	1.74		
CHLAMYDOMONAS SP.	6	0.61		
UCYSTIS SOLITARIA	11	1.12		
FRAGILARIA CROTONENSIS	15	1.54		
CRYPTOMMAS SP.	6	0.61		
SCENEDESMEUS BIJUGA	1	0.10		
GLUCOCYSTIS SP.	1	0.10		
FRAGILARIA CAPUCINA	16	1.64		
SCENEDESMEUS OPOLIENSIS	1	0.10		
UCYSTIS SP.	4	0.41		
FRANCEA OVALIS	3	0.30		
CALUNEA SP.	1	0.10		
SYNDECA ULNA	1	0.10		
MALLOMONAS SP.	1	0.10		
TETRAERON MINIMUM	1	0.10		
CYCLIETELLA SP.	5	0.51		

## Appendix B continued

NDC-2-7	3.6	11.60	4.27	5	0.53
NDC-2-1	4.3	9.47	4.05	1	0.10
<i>CRUCICENTIA QUADRATA</i>				1	0.21
<i>AKISTODESMUS FALCATUS</i>	1.2	1.01		2	0.42
<i>CYCLOTELLA SP.</i>	1.2	1.01		4	0.36
<i>CHLAMYDOMNAS SP.</i>	1.72	14.57		88	9.36
<i>TARELLARIA FENESTRATA</i>	1.6	7.11		88	9.36
<i>DICYSTIS SP.</i>	1.20	10.16		228	24.25
<i>PERIDINUM SP.</i>	0.90	6.77		54	5.74
<i>DINOBRYIN DIVERGENS</i>	0.64	5.42		57	6.06
<i>ANABAFNA CIRCINALIS</i>	2.4	2.03		32	3.40
<i>POTIASTRUM DUPLEX</i>	3.6	3.95		25	2.65
<i>CRYPTCHUNAS SP.</i>	4	0.33		25	2.65
<i>SYMEDRA SP.</i>	2.6	2.03		18	1.91
<i>SCENEDESMEUS SP.</i>	2.0	1.69		23	2.44
<i>FRAGILARIA CROTONENSIS</i>	2.0	1.69		87	9.25
<i>SPURES</i>	6.4	5.42		17	1.80
<i>DICTYOSPHAIRUM PULCHELLUM</i>	2.8	2.37		23	2.44
<i>GLOEOPHYTIS SP.</i>	3.6	3.05		2	0.21
<i>MELOSIRA GRANULATA</i>	2.0	1.59		3	0.31
<i>CCELASTHUM SP.</i>	5.6	4.74		3	0.31
<i>AGALLOMNAS SP.</i>	8	0.67		2	0.21
<i>MICROCTETIA SP.</i>	4	0.33		29	3.08
<i>FRAGILARIA PINNATA</i>	8	0.67		7	0.74
<i>KIRCHNERIELLA SP.</i>	1.2	1.01		16	1.79
<i>QUADRIGULA SP.</i>	8	0.67		3n	3.19
<i>FRANCEA OVALIS</i>	4	0.33		12	1.27
<i>MELUSINA GRANULATA V. ANGUSTISSIMA</i>	8	0.67		5	0.53
<i>CCSMARIUM SP.</i>	1.68	1.23		6	0.63
<i>NAVICILLA SP.</i>	1.2	1.01		3	0.31
<i>SCENEDESMEUS ABUNDANS</i>	8	0.67		1	0.10
<i>SCENEDESMEUS OPOLIENSIS</i>	8	0.67		5	0.53
<i>SCENEDESMEUS DIMORPHUS</i>	4	0.33		6	0.63
<i>TEKTAFORON MINIMUM</i>	4	0.33		1	0.10
<i>FRAGILARIA INTERMEDIA</i>	4	0.33		1	0.10
<i>CLUSTFRUM SP.</i>	20	1.69		2	0.21
<i>CLUSTEROPSIS LONGISSIMA</i>	4	0.33		1	0.10
BLUE-GREEN UNKNOWN COLONIES	4	0.33		2	0.21
	1.35	1.35		2	0.12
	16	1.35		2n	

APPENDIX B continued